UNIVERSITY OF EDUCATION, WINNEBA

THE INFLUENCE OF SENIOR HIGH SCHOOL TEACHERS' DEMOGRAPHIC VARIABLES ON THEIR SELF-EFFICACY IN TEACHING MATHEMATICS IN THE ASHANTI REGION OF GHANA

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DECLARATION

STUDENT'S DECLARATION

I, ADUSEI OPOKU, declare that this Dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted either in part or whole for another degree elsewhere.

SIGNATURE:..... **DATE:**.....

SUPERVISOR'S DECLARATION

I, hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Dissertation as laid down by the University of Education, Winneba.

SUPERVISOR'SNAME: **PROFESSOR FREDERICK KWAKU SARFO**

SIGNATURE:..... **DATE:**.....

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DEDICATION

To my Supervisor Professor Frederick Kwaku Sarfo and my children, Addo George and Kwame Adusei Opoku.

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ABSTRACT

It is acknowledged that teacher efficacy is associated with mathematical instructional quality and student confidence. The purpose of this study was to examine the influence of senior high school (SHS) mathematics teachers' gender and teaching experience on their self-efficacy in teaching mathematics in Ashanti Region of Ghana. A 27-item questionnaire was given to a random sample of 154 Senior High School mathematics teachers in 20 Senior High schools to respond. The result of the study showed that the teachers' efficacy level was high. Again, the result of the independent sample t-test indicated that the male mathematics teachers have high self-efficacy belief than the female counterparts. Once more, one-way ANOVA Test results with respect to teacher teaching experience show that there was no statistically significant difference between the means of the five groups of teacher teaching experience on Mathematics teacher efficacy. There was also a fairly strong and positive correlation between teachers' perceived usefulness of mathematics and teacher efficacy in teaching Mathematics. It is recommended that all mathematics teachers in general and female Mathematics teachers in particular in the Ashanti Region should undergo constant professional development programmes as it is seen as one of the most important factors influencing teacher efficacy belief in teaching mathematics. It is also suggested that further research should involve a test in content knowledge, so that teachers can be assessed to confirm their confidence in content knowledge, rather than allowing them to rate themselves without the actual test.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter begins with background to the study, and it is followed by statement of the problem. The purposes of the study, research question and hypotheses as well as the significance of the research are also given in that order. Again, delimitation, limitation, definition of terms and organisation of the study are also done.

1.1 Background to the Study

Most governments spend much on education as a proportion of their total budget is allocated to the education sector. This is because they tend to see the educational process as a principal means of producing the sort of intelligent and skilled workforce required to operate in this changing environment at all levels of the economy. We are therefore going through a period of expansion and change in many public educational systems all over the world, as governments try to implement the sort of educational programmes they think will realise their aims but within the resources available to them. The change is represented by increased access to education at all levels, and a resultant re-thinking of the aims, objectives, and manner of delivery of the curriculum.

The level of educational achievement in a country influences both directly and indirectly the degree of economic growth and development that is achievable in that country. Education adds to the growth and development directly through employment,

improved productivity and the composition of a civil population that is suitable to promote social progress (Akyeampong, 2006). In the same vain Aboagye (2002) notes that more educated citizens have a superior chance of transforming knowledge and assets into productive livelihoods, which provide the basic needs of food, shelter, health, and freedom from ignorance. Educated people tend to be more productive and are better able to play a productive and informed role in civil society. Education provides the scholarly skills to enable people adapt to change and to embrace new ideas in a dynamic relationship with cultural traditions. The moving force behind all the changes is the teacher.

Mathematics plays a vital role in everyday life. There is nothing an individual would do in a day that would not have the application of some mathematical knowledge. Mathematics plays a significant role in shaping how individuals deal with the various scopes of private, social, and civil life (Anthony & Walshaw, 2009). Mathematics takes a major position in human advancement. It is a medium of social functions in our everyday life (Mondoh, 2005). The social functions comprise buying, selling, and banking, among others. Everyone is also conscious that mathematics is the key to all field of studies be it the Sciences, Technology, and Social Sciences, or even Law in any University all over the world. Mathematics is therefore a subject that supports all the sciences. As a result of this, no nation can hope to advance higher in science and technology without the proper foundation in secondary school mathematics. Therefore, the teaching and learning of Mathematics in Ghanaian schools, as in most other countries, is prescribed by the national curriculum which aims at providing equal learning opportunities for all students (Kuwayama, Davis, Ampiah, & Kwabla, 2007; Nabie & Kolorah-Ekpale, 2004). This validates the compulsion of the study of the subject by all students who go through basic and

secondary education in most countries. Mathematics is therefore a core subject at these levels of education in Ghana. The importance of Mathematics as pre-requisite subjects to gain admission into higher institutions of learning in Ghana and some West African countries such as Nigeria, The Gambia, Sierra Leone and Liberia (These countries have the same colonial origin and jointly established the WAEC) has made the subjects compulsory or mandatory to be passed at credit level by secondary schools students in public examinations. A credit level in the subjects has been used as one of the conditions for measuring and establishing the brilliance of a particular candidate in the Ghanaian context. Because knowledge of Mathematics is vital to human action and expansion, it is disastrous that students' performance in the subject is poor. Over the years, Mathematics result in the Senior High School at West African Senior School Certificate Examination (WASSCE) has been very disheartening. Many students nearly cluster in the Pass grades while majority obtain outright Fail (F) grades. Students' poor performance in Mathematics has assumed a worrying dimension in Ghana. Hence researchers have been on the search to find a permanent solution to this endemic that obscure the teaching and learning of Mathematics, particularly in developing African countries like Ghana. Of course, the poor performance of Secondary School Students in WASSCE Mathematics had made it difficult for majority of students to gain admission into higher institutions of learning in recent times. In Ghana, research by Eshun-Famiyeh (2005) established that notwithstanding the significant role that effective knowledge in Mathematics plays in both personal and national development, Mathematics continues to be the most challenging subject in the school curriculum at all levels of Ghana's education system and this general perception is reflected in students' performance over the years.

Improving the teaching and learning of Mathematics has consequently become an issue of significant concern in almost every part of the world. These demands have led to restructuring and the introduction of new school curriculum and teaching methods. The development of these new school curricula and methods is designed to find ways to empower students to use practical and investigative approaches when learning Mathematics; these approaches have been the new trend in the field for some time now (Thomasenia, 2000).

As a result of this in Ghana, the government and other stakeholders in the education sector have introduced a number of initiatives to support effective teaching and learning of Mathematics with the aim of making the subject more pleasurable (Anku, 2008). For example, in 2003 the Ministry of Education (MoE), in collaboration with the Teacher Education Division (TED), reviewed the teacher education curriculum and upgraded all Initial Teacher Training Colleges to diploma awarding institutions with the aim of improving teachers' knowledge of content and pedagogical skills in the various subject areas. In addition, the Ministry of Education, in collaboration with other international agencies such as the Japan International Cooperation Agency (JICA), the United States Agency for International Development (USAID) and the Department for International Development (DFID), of the United Kingdom have shown massive commitment by embarking on Mathematics and science projects to improve the teaching and learning of Mathematics and science at the basic, secondary, teacher training and tertiary levels (Ampiah, Akwesi, Kutor & Brown-Acquaye, 2000).

Again, the approaches and methods used for teaching mathematics in schools can have a massive influence on how much students learn in the classroom as well as on the quality of the learning that takes place. Appropriate teaching methods can

improve students' level of understanding and help them master mathematical rules and procedures. The methods used also impact how students engage with and enjoy their learning, which, in turn, also impacts indirectly on how much and how well they learn. Teaching methods support all learning in the classroom. They apply to subject content and how it is being taught, e.g. focusing on mathematical principles and processes or focusing on the application of mathematics in the real world. They also determine the nature of the interactions which take place in the classroom, such as those between the teacher and the whole class group, between the teacher and individual students, or between small groups of students.

For teachers to use appropriate approaches and methods for teaching it is frequently stated that teachers should be professionals. Hurst and Reding (as cited in Mahajan, 2012) indicate that the noun 'professional' means 'a person who does something with great skill'. Trained teachers should therefore display great skills in teaching. The authors also indicate that the adjective 'professional' means 'worthy of high standards of a profession'. This means that for teachers to be professionals, they need to learn what those high principles are and then strive to meet them. Glaser (as cited in Mahajan, 2012, p.8) took these ideas a step further and stated that getting the job done, even done well, is good enough for non-professionals, but repeatedly improving the way the job is done both for themselves and others, is the hall mark of professionals. This should be a suitable description for teachers, because as professionals, teachers should always be looking for better ways to teach. Teachers need to care about doing the best job of teaching our students and making a difference in their lives.

There has been a surge of concern on examining the role of teachers' personal characteristics in their teaching preferences. Frequently the studies focus on how

demographic variables such as gender, age, and experience influence teaching and learning styles (Severiens, 1997; Brew, 2002).Gender is one crucial factor which might influence, in one way or another, teachers' professional lives preferences particularly considering their personality and individual characteristics (Karimvand, 2011).According to Pajares (2005), there appears to be a developmental trend in which females' confidence in their Mathematics and science ability become significantly lower than males' confidence in their Mathematics and science ability as they get older. Additionally, there is a difference between males and females' view regarding their future performance in Mathematics and science related careers. Findings suggest that females' perceive their success in Mathematics and science courses to be lower than males, and consequently, fewer women choose to major in fields related to Mathematics and science once they reach college or even after graduation from college (Britner & Pajares, 2001; Britner & Pajares, 2006). Again, since teachers usually gain extensive experience of successful and unsuccessful performances throughout their years of teaching, this assumption has generated in-depth research into how teachers who have been involved in teaching for different periods of time perceive their teaching (Fives & Lisa, 2008; Fives& Buehl, 2010 and Kotaman, 2010). Wolters and Daugherty (2007) found that teachers in their first year of teaching reported significantly lower self-efficacy for instructional practices and classroom management than did teachers with more experience. It was in this regard that I am motivated to investigate the influence of Senior High School teachers' demographic variables on their self-efficacy in teaching Mathematics in the Ashanti Region of Ghana.

1.2 Statement of the Problem

The literature on teacher efficacy has mainly concentrated on the following areas of teaching efficacy: (1) Mathematics teachers' perceived self-efficacy towards Web Pedagogical Content Knowledge (Akayuure, Nabie, & Sofo, (2013); (2) gender differences in teachers' personal financial concerns and self-efficacy in teaching and dealing with personal finance pedagogy (Ansong, 2013); (3) pre-service basic science teachers' self-efficacy beliefs and attitude regarding science teaching (Ngman-Wara & Edem, 2016);(4) efficacy beliefs of kindergarten teachers regarding instructional practices (Cobbold & Boateng, 2015); (5) kindergarten teachers' efficacy beliefs in classroom management (Cobbold & Boateng, 2016); (6) teacher-trainees' sense of efficacy in students' engagement, instructional practices and classroom management in Social Studies lessons (Bekoe, Kankam, Ayaaba, Eshun, & Bordoh, 2015); and (7) attitude towards constructivist approach and self-efficacy: perspective of secondary school teachers (Guha & Paul, 2014).

The rest are (8) teacher efficacy and student engagement in learning in Junior Secondary School classes (Moalosi, 2012); (9) effect of methods of teaching mathematics course on elementary pre-service mathematics teachers' mathematics teaching efficacy beliefs (Albayrak & Unal, 2011); (10) elementary teachers' mathematics teaching efficacy beliefs and factors that increase their efficacy beliefs (Kim , Sihn, & Mitchell, 2014); (11) levels of pre-service and in-service Secondary Science teachers' self-efficacy beliefs relating to science teaching and analyse the change of these beliefs according to their demographic characteristics such as gender, graduate school type, teaching experience and major (Azar, 2010); (12) science-teacher candidates' science teaching self-efficacy beliefs according to grade level and gender (Yalçin, 2011); (13) relationships between and among the conceptions of

mathematics, mathematics teaching efficacy beliefs and mathematics anxiety of pre-service students with mathematics as their major subject (Mji & Arigbabu, 2012); (14) effect of teaching practice on science teaching efficacy beliefs (Nneji, 2013); (15) changes in early childhood teacher candidates' mathematics teaching efficacy beliefs (MTEB) after the implementation of a play-generated curriculum approach (Incikabi, 2013); (16) relationship between gender and self-efficacy beliefs in instructional strategies, classroom management and student engagement among senior high school teachers (Sarfo, Amankwah, Sam, & Konin, 2015). However, studies on the influence of Senior High School teachers' demographic variables on their self-efficacy in teaching Mathematics are not known in the current literature. There was therefore the need to investigate the influence of Senior High School teachers' demographic variables on their self-efficacy in teaching Mathematics in the Ashanti Region of Ghana.

1.3 Purpose of the Study

The purpose of this study was to investigate the influence of Senior High School Mathematics teachers' demographic variables on their self-efficacy in teaching mathematics in the Ashanti region of Ghana. Precisely the study sought to:

1. assess the general teaching efficacy of Mathematics teachers in Ashanti Region
2. determine whether the self-efficacy of male Mathematics teachers will be higher than their female counterparts in the teaching of Mathematics.

3. find the relationship between Mathematics teachers' levels of self-efficacy beliefs and their years of teaching experience?
4. determine the relationship between Mathematics teachers' perceived usefulness of Mathematics and their efficacy towards the teaching of Mathematics?

1.4 Research Question and Hypotheses

The following are the research questions used to guide this study

1. What is the general teaching efficacy level of the mathematics teachers in Ashanti Region?
2. What is the efficacy level of the male and female Mathematics teachers?
3. What is the relationship between Mathematics teachers' levels of self-efficacy beliefs and their years of teaching experience?
4. What is the relationship between Mathematics teachers' perceived usefulness of Mathematics and their efficacy towards the teaching of Mathematics?

To answer research questions 2, 3 and 4 the following hypotheses were also formulated:

1. The self-efficacy of male Mathematics teachers will be higher than their female counterparts in the teaching of Mathematics.
2. The level of teacher self-efficacy for experienced Mathematics teachers will be higher than the less experienced Mathematics teachers in the teaching of Mathematics.

3. Mathematics teachers who perceive Mathematics to be useful are likely to be more efficacious than those Mathematics teachers who do not perceive such usefulness towards the teaching of Mathematics in Senior High Schools.

1.5 Significance of the Study

McLaughlin (1986) identifies the teacher as the most important resource in the schools, yet little is done to promote the continuing learning and improvement for those in the profession. There is currently a rich body of research which shows that teachers have the most essential effect on students' achievement and success (for example, Akbari, Kiany, Imani, & Karimi 2008;Saha & Dworkin, 2009). Since teachers play a key role in pedagogical success, there is an urgent need to know them and their personality features. Most of the research regarding teacher efficacy has been conducted in the US and other western nations and the theory has been criticized for its western bias (Gorrell & Hwang, 1995; Lin & Gorrell, 2001). So lack of research in this area provides sufficient reason to conduct this investigation. This research study is of significance to the educational system in Ghana, Ministry of Education, schools and institutions training teachers for the secondary schools in Ghana to be fully aware of teachers' perceived self-efficacy.

It has also provided the current level of teachers' self-efficacy of the secondary school Mathematics teachers, and the government can provide ways of boosting teachers' self-efficacy in the positive directions.

At the teacher preparation level, the significance of this study is to provide research based direction on how to build frameworks for teacher preparation and school induction programmes that most support teachers. The evidence from this

study would further teacher educators' understanding of the kinds of skills, knowledge, training, and practical experiences pre-service school teachers need to better help them understand and direct the reality of teaching. Essentially, the findings of this study may be possibly for the design and development of the curriculum, courses, and field experience structures of teacher preparation programmes to cultivate teachers with a greater sense of efficacy.

The knowledge gained through this study will benefit the teaching profession by providing additional understanding of the teacher efficacy of teachers teaching Mathematics in Senior High schools. This study is one of the very few to investigate in-service Mathematics teachers' efficacy of Ghanaian teachers in Senior High schools and provides literature review for others who would want to further consider this area for evaluation.

Finally, the study has revealed that the self-efficacy of Senior High School Mathematics teachers in Ashanti Region was high and has provided useful information for the inspectorate division of the Ghana Education Service (GES) on quality assurance issues concerning the teaching of mathematics. This would help GES in organisation of workshops to maintain the high self-efficacy of the Senior High School Mathematics teachers.

1.6 Delimitation of the Study

The present study was delimited to the following aspects taking into consideration the time available and limited resources.

1. The present study was delimited to teachers working in government secondary schools in Ashanti.

2. The present study was delimited to only two demographic variables i.e. gender and teaching experience.

3. The present study was again delimited to teachers teaching Mathematics.

1.7 Limitations of the Study

One limitation is in the area of the research design. Nardi (2006) recommended that a questionnaire is preferably suitable for respondents who can read, measuring people's opinions, and when we want to get very large number of respondents too difficult to observe with qualitative methods. The study's quantitative approach is the main limitation.The design could have been improved by including classroom observations, interviews and student attainment scores for the teachers that responded to the survey instrument. While these activities were beyond the scope of this study, the data would have improved the validity and reliability of the efficacy results.

Again a five-point Likert-scale questionnaire item was used to collect data on teaching efficacy. It was realised that most respondents desired not to choose the most extreme choices on the scale and eventually increased the sensitivity of the measure. In the opinion of Bandura (2006) scales that use only a few steps should be avoided because they are less sensitive and less reliable. People usually avoid the extreme locations so a scale with only a few steps may, in actual sense, reduce to one or two points. It was observed that the five points would be reduced to few points resulting in the loss of single out information. Since people who use the same response category

may differ if intermediate steps were included. This reduced the sensitivity of the measure. Once more, the sample in this study was relatively small. This is because out of the 30 districts in the Ashanti Region the sample was taken from 20 Senior High Schools in only six districts in the Ashanti Region of Ghana

1.8 Definition of Terms

In order to give the reader a comprehensive understanding of the discussion focusing on teacher self-efficacy and teacher attitudes, certain words and phrases will be defined in this section.

Gender: refers to male or female for this particular study.

Teaching experience: refers to the amount of experience a teacher has in the classroom as measured by number of years of teaching. Teachers with less than 5 years were regarded as less experienced and teachers with 5 or more years of teaching were regarded as experienced.

Self-Efficacy: The degree to which human actions is influenced by the individual's beliefs regarding two classes of expectations: an outcome expectation—a person's estimate that a given behaviour will lead to certain outcomes and an efficacy expectation—the conviction that one can successfully execute the behaviour required to produce the outcome.

Teacher Self-Efficacy: The degree to which teachers believe they can affect student learning.

1.9 Organisation of the Study

The study has been organised into six main chapters. The first chapter deals with the general introduction of the study, covering the background to the study, statement of the problem, purpose of the study, research question and hypotheses, significance of the study, delimitation of the study, limitations of the study and definition of concepts and variables used in the study. Chapter Two of the study deals with the review of related literature. It includes the empirical review of the research. Chapter Three also deals with the methodology which includes: research design, population, sample and sampling procedure, research instrument, validity and reliability of instrument, data collection procedure, as well as data analysis. Chapter Four of the study is devoted to the presentation of results in line with the four research questions. The Chapter Five is devoted to the discussion of the findings from the results. The last chapter, which is chapter six, concerns the summary, conclusions and recommendations made by the researcher to address the research questions in Chapter One

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter reviews literature related to the topic – the influence of Senior High School Mathematics teachers' demographic variables on their self-efficacy in teaching mathematics in the Ashanti Region of Ghana. In order to have an unambiguous picture of the present position of research which can present an insight as well as scope, the literature reviewed in this chapter encompassed three areas. The first is an overview of self-efficacy, teacher self-efficacy, characteristics of high and low efficacy teachers, dimensions on high and low efficacy teachers**,** efficacy measures, sources of efficacy expectations and importance of teacher's sense of efficacy. The second section considers teachers demographic characteristics (independent variables), namely gender, and teaching experience. The third section considers perceived usefulness of Mathematics as a subject of study.

2.1 Definitions of Self-Efficacy and Teacher Self-Efficacy

Teacher self-efficacy is a definite construct about the self-efficacy beliefs of teachers. Yet, self-efficacy theory did not begin in the field of education but in the field of psychology. Cubukcu (2008:149) studied self-efficacy theory and advanced the following definition of self-efficacy. He states, "Self-efficacy is a person's judgment of his or her capabilities to organize and execute courses of action required to attain chosen types of performances". Simply put, self-efficacy is the response of a person to the question, "Can I do this task well?" Ormrod (2006) describes self-

efficacy as the measurement of individuals' skills to reach their goals and complete given tasks.

Scholars have referred to teacher efficacy as teacher sense of efficacy in the literature (Tschannen-Moran & Hoy, 2001). Whether the term is teacher efficacy, or sense of efficacy, the terms hold the ideas that were initiated in the Research and Development (RAND) studies concerning a teacher's belief about his or her ability to affect student achievement or performance (Armor, Conroy-Oseguera, Cox, King, McDonnel, Pascal, & Zellman 1976; Dellinger, 2001).

Tschannen-Moran, Woolfolk-Hoy, and Hoy (1998) elaborated the concept of self-efficacy in the teaching context and defined teaching efficacy as teachers' beliefs in their own abilities to accomplish specific tasks related to teaching. Skaalvik and Skaalvik (2008) pointed out that teacher self-efficacy talk about teachers' capacity to plan, organize, and carry out activities required to achieve instructional goals. Teacher self-efficacy refers to teachers' beliefs that they can bring about desirable changes in students' behaviour and achievement (Guo, Justice, Sawyer, & Tompkins, 2011). In other words, teacher self- efficacy is the belief that he/she has the needed competences to help students learn (Jaafari, Karami, & Soleimani, 2012). This is still in line with the Research and Development initiative on teachers believe about their ability to improve students' performance

Schunk (2012) on the other hand defines teachers' self-efficacy as instructional self-efficacy, signifying personal beliefs about one's ability to help students learn. Consequently, instructional self-efficacy should affect the teacher's activities, effort, and persistence with students (Ashton & Webb, 1986). This definition suggests that for students to learn magnificently, teachers must believe in

their own abilities to enhance learning. If a teacher does not have instructional self-efficacy beliefs, students can be lacking in learning. In fact, Schunk (2004) upholds that instructional self-efficacy is vital as it not only relates to the capacity to teach but also relates to an individual's beliefs about his/her ability to help students learn. This, in turn, influences the quality of teaching that is intended.

Teachers' self-efficacy is additionally defined as consolidating their belief that they have the capability to impact a student's performance (Brouwers & Tomic, 2003), as well as their learning and attainment (Denzine, Cooney, & McKenzie, 2005). According to Dellinger, Bobbett, Olivier, & Ellett, (2008:2) teacher efficacy is a construct arising out of self-efficacy, refers to teachers' "belief in their proficiency to perform specific teaching tasks at a specified level of excellence in a given specified situation".

Teacher efficacy is vital to what is termed as intentional teaching (Slavin, 2006). A teacher who comes to the classroom and organizes lessons with intention is much more probable to certainly impact student engagement and learning than one who sees his or her position as simply a job to be endured. Effective teachers consequently teach not only to earn a salary, but to develop students' learning. In the context of teacher efficacy research, teacher self-efficacy is thus professed to be a "predictor of student achievement".

The concept of self-efficacy thus appraises self in association with ones' past performance. It can consequently be considered as a criterion-reference evaluation of self (Choi, 2005). Self-efficacy beliefs thus become self-fulfilling prophecies, upholding capabilities or inabilities (Bandura, 1977).

Devoid of self-efficacy, people do not spend effort in activities because they perceive their efforts will be fruitless. Efficacy discussions according to Lavelle (2006) are frequently concentrated on three degrees of efficacy: high, mid and low. Those with high confidence in their ability are usually considered as having a positive sense of efficacy or high efficacy. Likewise, those who have moderate levels of confidence in their ability are designated as having a moderate sense of efficacy. Those with low levels of confidence in their ability are often denoted to as having less confidence, doubting their ability, having low ability, or having a less positive sense of efficacy.

Evers, Brouwers, and Tomic (2000) stated that self-efficacy is related not only to ones' skills or competences but also the belief that one is able to do things in some cases. So, self-efficacy includes both one's competences and beliefs in terms of oneself being able to operate successfully. Research from a variety of academic areas suggests that beliefs have a particularly strong influence on teacher behaviour, since "the beliefs teachers hold influence their perceptions and judgments, which, in turn, affect their behaviours in the classroom" (Pajares, 1992). In particular contexts, beliefs may be stronger than knowledge as a predictor of teacher practices (Weiss, Pasley, Smith, Banilower, & Heck, 2003). It is therefore important that beliefs, especially particular sets of beliefs, have a central role in research whose aim is to understand teacher behaviours (Pajares, 1992) and to successfully help teachers to implement educational reform (Eisenhart, Shrum, Harding, & Cuthbert, 1988). Brouwers and Tomic (2000) noted that people who doubted their abilities in particular domain of activity were quick to consider such activities as threats, which they preferred to avoid. Hipp (1995) therefore revised the definition to teaching as "the extent to which a teacher believes that he/she can affect student performance" (p.34).

Swars and Dooley (2010) defined teaching efficacy as having two portions. The first part, personal teaching efficacy, is teachers' beliefs in their skills or abilities to be efficient teachers. When related to Mathematics, it can be considered as a teacher's personal Mathematics teaching efficacy, looking at teachers' beliefs in their skills or abilities to be effective teachers of Mathematics (Briley, 2012). The second part of teaching efficacy is teaching outcome expectancy. This looks more precisely at a teacher's belief in effective teaching and its association to student learning (Swars & Dooley, 2010).

Other researchers (Ashton & Webb, 1986; Tschannen-Moran & Woolfolk-Hoy, 2001; Woolfolk & Hoy, 1990) have also considered teacher efficacy as encompassing two independent dimensions. Firstly, teachers harbour beliefs about their own personal abilities to affect their students' learning and achievements. This was termed 'personal teacher efficacy'. Secondly, teachers also hold beliefs regarding the extent to which teaching can overcome external influences on the student. This was termed 'general teacher efficacy'. For example, a teacher might hold a high level of personal teacher efficacy' but lower general teacher efficacy' if he or she believes that the home and environmental factors that are outside the teacher's control, have a greater impact on student learning than the teacher. On the contrary, a new teacher who feels astounded and at times unprepared may believe that teachers, in general, can teach children effectively, but the teacher himself/herself personally lacks the skills essential to help students master the curriculum.

2.2 Sources of Teacher Self-efficacy

Self-efficacy beliefs, according to Bandura (1997) can develop from four key sources: enactive or mastery experiences, vicarious experiences, verbal persuasion, and physiological and emotional states (as shown in Figure 2.1., page 23). In other words, they are "performance outcomes; vicarious experiences of witnessing the performances of others; verbal persuasion and associated types of social influences that one possesses assured capabilities; and physiological states from which people somewhat judge their capability, strength, and susceptibility" (Nolan, 2009).

The first part of the advocated source of self-efficacy is when teachers estimate the consequences of their actions to determine their self-worth. This first source of self-efficacy beliefs is sometimes called "mastery experiences" or "experiences of mastery (Bandura, 1997). This refers to the way people gauge their own personal accomplishment in a given field. Mastery experience, the most leading influence on teacher self-efficacy, occurs when teachers take on and master a new classroom skill or challenge. When individuals prolifically master a challenging task, they begin to build a superior sense of self- efficacy. When a teacher later faces a related experience, they are able to draw on the experience of mastery with a potent expectation for success. For teachers, mastery experiences come from actual teaching accomplishments with students (Bandura, 1997).

Ross (2007) contended that more effective teaching should increase the prospect of teachers gaining mastery experiences, the strongest predictor of self-efficacy. Teachers develop high teacher self-efficacy from their successes in the classroom (master experience) such as forming a classroom environment conducive to student achievement.

The second source of self-efficacy beliefs emanates from the actions of the people surrounding the teacher and how that influences the teacher (Bandura, 1986). This is referred to as vicarious experiences. When people are not sure about themselves and have a lower sense of self-esteem, they tend to be considerate to what others are doing around them. This could involve the significance of having a model or mentor for a teacher to learn from and to develop a strong sense of self-efficacy. Vicarious experiences thus influence the building of self-efficacy by seeing other people magnificently complete a task. Seeing that the task is attainable helps teachers to feel that they can be successful, as well.

Since teaching lacks absolute measures of appropriateness, teachers must assess their competences in relation to the performance of others (Bandura, 1997). The observer has the chance to appraise his or her own capabilities because the model provides a standard and this can help the onlooker set goals for his or her own teaching. The superior the assumed correspondence between the observer and the model, the more convincing will be the belief that one possesses the capabilities to master equivalent activities. When an observer watches a successful teaching exchange, he or she is more likely to see the teaching task as practicable. Likewise, when the teaching model fails notwithstanding strong efforts, the observer may judge the teaching task to be out of grasp. People profoundly seek expert models who demonstrate the competencies to which they aspire. Skilful models transmit knowledge and teach observers actual skills and strategies for managing task demands through their behaviour and by revealing their thinking about the task at hand.

Both Bandura (1997; 1995) and Labone (2004) stressed that, for modelling to effectively provide information to supplement efficacy beliefs, individuals must observe models who possess similar ability, share similar attributes, illustrate

successful performance or flexibility during failure, expose observers to performance under varied conditions, and frequently demonstrate their competency. Ebmeier (2003) and Labone (2004) noted that vicarious experiences denote an important source of teacher efficacy beliefs. Teachers derive valuable information within school environments where they can observe the experiences of their contemporaries or superiors within mutual relationships, collaborative efforts, frequent interactions, and social networks (Moolenaar, Sleegers, & Daly, 2012).

Vicarious experience is claimed to have a weaker influence than mastery experience because it can also be negated by performance setbacks (Schunk & Meece, 2005). In other words, observing people comparable to oneself who fail can lower an individual's confidence and subsequently undermine future efforts.

The third source of self-efficacy beliefs is the influence from other people's verbal persuasions (Bandura, 1986). Verbal persuasions are also termed "social persuasions." Verbal persuasion embraces verbal input from others, such as colleagues, supervisors, and administrators that serve to support a person's belief that he or she possesses the capability to achieve a desired level of performance. Bandura (1997) noted that it is easier to sustain a sense of efficacy, particularly in times of difficulty, if significant others express faith in one's capabilities than if they convey uncertainties. The verbal communication a teacher experiences about his or her performance and prospects for accomplishment from valued others in the teaching context, such as administrators, colleagues, parents, members of the community, etc. can encourage or discourage teacher self-efficacy perceptions. When a trustworthy colleague tells you that you can be successful with a challenge, you are more likely to approach the task with a high expectation of success. Thus according to Bracket, Palomera, Mojsa-Kaja, and Reyes (2010) persons who get social support from those

close them feel cared for and secured. These teachers recognize that they have someone to communicate with during times of stress (Bracket et al., 2010). Negative verbal persuasions on the other hand from other teachers and staff can damage the self-image of teachers.

Finally, self-efficacy beliefs are informed by emotional and physiological states such as anxiety, stress, fatigue, and mood. Bandura (1997) proposes that people tend to function optimally when their physiological stimulation is neither too high nor too low, that is, physiological arousal may be curvilinealy related to self-efficacy. When a person upsurges his or physical and emotional well-being, thus reducing undesirable emotional states the action strengthens self-efficacy. When teachers are emotional, their keenness of success or failure is greater (Pajares, 1996). Burns and Gunderman (2008) said that, "much of our suffering arises not only from what occurs in our lives, but from the way we interpret those events" p.567). When teachers provide rigorous instruction that promotes student achievement they typically experience increased happiness in their abilities. When a teacher conducts a lesson and has feelings of joy or pleasure from teaching the lesson there can be an increase in the sense of efficacy. Classroom practices promoting warm relationships between teachers and students have been associated with positive student outcomes (Connor, Son, Hindman, & Morrison, 2005). However, if the teacher experiences high levels of tension or nervousness with fear of losing control, this can result in lower self-efficacy beliefs. Teachers with a high sense of efficacy appear to employ an array of strategies that decreased negative effects and "promoted an anticipation of classroom situations characterized by kind interpersonal relationships and academic work" (Ashton & Webb, 1986, p.125). Teachers' opinions of the positive and negative

impacts from administrators can influence teacher self-efficacy both psychologically and emotionally.

Figure 2.1 Sources of Self-efficacy (Bandura, 1982)

2.3 Characteristics of High and Low Efficacy Teachers

Bandura (1997) found that teachers who have a high sense of self-efficacy have a strong commitment to teaching, tend to regard learning problems as resolvable, make far-reaching efforts to motivate students, dedicate more class time to academic work, provide students with guidance and praise for their accomplishments, and in general are associated with higher levels of student achievement.

On the other hand, teachers with low self-efficacy spend less time on instruction, do not persist when students experience problems, have a dictatorial approach, make little effort to motivate students and have a weak commitment to teaching the subject matter (Bandura, 1997). Bandura (1997) further added that teachers who were highly efficacious were also found to be more likely to use open-ended inquiry and student-directed teaching strategies, whilst teachers with a low sense of self-efficacy were more likely to use teacher-directed teaching strategies such as lecture and reading from the text.

Low self-efficacy does not only affect an individual teacher performing his or her work. According to Tschannen et al. (1998), a low sense of efficacy can be transmittable among a staff of teachers, creating a self-defeating and demoralizing cycle of failure. Low teacher efficacy leads to low student efficacy and low academic achievement, which in turn leads to further declines in teacher efficacy (Bandura, 1997). Self-efficacy is contagious not only amongst the teacher's colleagues but students can easily 'catch' a teacher's own sense of confidence (Parajes, 2006).

Ross (1998) saw high efficacious teachers trying harder and using management strategies that stimulate student autonomy. They are also more likely to be effective in their classrooms by displaying enthusiasm for teaching, being open to students' ideas, and using novel instrumental methods that reflect their instruction (Chen, 2006). The same teachers tend to create environments to achieve learning goals (Lorsbach & Jinks, 1998) and use less criticism (Pajares, 2002).

Highly self-efficacious teachers view student failure as an encouragement to greater teacher effort rather than ending that the causes of failure are outside teacher control and cannot be reduced by teacher action (Ross & Bruce, 2007). Schriver and

Czerniak (1999) stated that low self- efficacy teachers expect low achieving students to fail, expressing no shock when their expectations came true, and taking no responsibility for the academic failures of their students. On the other hand, highly self-efficacious teachers believed that they could reach their low achieving students and overcome the problems of students. They saw it as their responsibility to help these students overcome their problems and took pride in their ability to teach these students. They believed that troublesome behaviour could be avoided if teachers made clear and fair rules, enforced them consistently, and established friendly relationships with students. The students of such high efficacious teachers have demonstrated that they have more positive attitudes and achieved higher performance levels on achievement tests (Riggs, 1991)

Allinder (1994) found that Personal Teaching Efficacy (PTE) was linked to instructional experimentation, including readiness to try a variety of materials and approaches, the desire to find better ways of teaching, and implementation of progressive and innovative. High-efficacy teachers with high scores on both the PTE and GTE (General Teaching Efficacy) factors, were less likely to criticise a student for an improper response and more likely to persist with a student in a failure situation. These teachers were more likely to divide the class for small group instruction, instead of instructing the class as a whole (Tschannen-Moran, 1998). The levels of organization, planning, and fairness a teacher displayed, as well as clarity and enthusiasm in teaching, were also related to PTE. GTE was related to clarity and enthusiasm in teaching (Tschannen-Moran, 1998).

2.4 Ashton's Dimensions on High and Low efficacy Teachers

From the analysis of Thematic Apperception Test-type responses of middle school teachers, Ashton (1984) identified 8 dimensions that distinguished the high from the low efficacy teachers. The dimensions explained in the paragraphs that follow.

A sense of personal accomplishment**:** Teachers with a high sense of efficacy believe that the work with their students is significant and meaningful and that they have a positive influence on student learning. Whereas those with low sense of efficacy feel frustrated and discouraged about teaching

Positive Expectations for student behaviour and achievement: Teachers with a high sense of efficacy expect their students to progress and most of the time find that students fulfil their expectations. On the other hand, those with low sense of efficacy expect their students to fail, to react negatively to their teaching effort, and to misbehave.

Personal Responsibility for student learning: Teachers with a high sense of efficacy believe that it is their responsibility to see that children learn and when their students experience failure, they examine their own performance for ways they might have been more helpful. Those with a low sense of efficacy shift the responsibility for learning onto their students and when they fail, they look for explanations in terms of students' ability, family background, motivation, or attitude.

Strategies for achieving objectives: Teachers with a high sense of efficacy plan for student learning, set goals for themselves and their students and identify strategies to achieve them. Teachers with a low sense of efficacy tend to lack specific

goals for their students. They are uncertain about what they would like their students to achieve and do not plan teaching strategies according to identifiable goals.

Positive affect: Teachers with a high sense of efficacy feel good about teaching, about themselves and about their students. Those with low sense of efficacy are irritated with teaching and regularly express discouragement and negative feelings about their work with students.

Senses of control: Teachers with a high sense of efficacy are confident that they are able to influence student learning. Teachers with a low sense of efficacy experience a sense of ineffectiveness in working with students.

Sense of common teacher-student goals: Teachers with a high sense of efficacy feel that they are involved in a joint venture with students to achieve goals that they share in common. Those with a low sense of efficacy feel that they are engaged in a struggle with students whose goals and concerns are in opposition to theirs.

Democratic decision making: Teachers with a high sense of efficacy involve students in decision making about goals and strategies for achieving goals. Those with a low sense of efficacy impose their decisions regarding goals and learning strategies on students without involving them in the process of decision-making.

2.5 Efficacy Measures

In measuring efficacy, people are being asked to judge their current operative capabilities (Bandura, 2001). That is, individuals judge their competencies against an activity that may occur in the imminent future rather than in the more distant future.

Measuring self-efficacy requires "more than simply asking about one's generalized perceptions of competence in the given domain" (Bong, 2006, p.288). Asking whether someone has certain abilities or is good at certain tasks is different from

> "asking whether one can execute, with those recognized capabilities, the requisite course of action to meet a variety of situational demands for achieving successful performance. For this reason, researchers are encouraged to phrase self-efficacy items with "I can" rather than "I will" to emphasize forward looking capability (Klassen, Tze, Betts, & Gordon, 2011, p. 32).

Tschannen-Moran, Woolfolk Hoy, and Hoy, (1998) stated that a valid measure of teacher efficacy must encompass both an assessment of personal competences and an analysis of the task in terms of the resources and constraints that exist in particular teaching contexts. Most existing measures of teacher efficacy did not include both dimensions of efficacy. Their study examined the underpinnings of teacher efficacy to bring coherence to the construct and its measurement. The research compared the different efficacy measures to see if there was one that was best for measuring teacher efficacy. The study examined the following measures of efficacy: RAND measure, Teacher Locus of Control, Responsibility for Student Achievement, Webb Efficacy Scale, Gibson and Dembo's Teacher Efficacy Scale, Science Teaching Efficacy Belief Instrument, Ashton Vignettes, and Bandura's Teacher Efficacy Scale. Each measure has its own way of measuring teacher efficacy with similarities and slight differences from each other. In an attempt to capture the meaning of this construct, researchers

have tried long, detailed measures and short, general ones (Tschannen-Moran et al., 1998).

Bandura has been a leader on how to best measure teacher efficacy. Bandura (1997) pointed out that teachers' sense of efficacy is not necessarily uniform across the many different types of tasks teachers are asked to perform nor across different subject matter. He constructed a 30-item instrument with seven subscales: efficacy to influence decision making, efficacy to influence school resources, instructional efficacy, disciplinary efficacy, efficacy to enlist parental involvement, efficacy to enlist community involvement, and efficacy to create a positive school climate. Each item is measured on a nine-point scale anchored with the notations "nothing, very little, some influence, quite a bit, and a great deal" (Tschannen-Moran et al., 1998). The more closely the observer identifies with the model, the stronger will be the impact on efficacy (Bandura, 1997). Bandura (1997) also stated that when a model with whom the observer identifies performs well, the efficacy of the observer is enhanced. When the model performs poorly, the efficacy expectations of the observer decrease.

To be useful and generalizable, measures of teacher efficacy need to examine teachers' assessments of their competence across the wide range of activities and tasks they are asked to perform. However, there is a danger of developing measures so specific that they lose their predictive power for anything beyond the specific skills and contexts being measured (Tschannen-Moran et al., 1998). Tschannen-Moran et al. recommended the studies test the relative predictive power of assessments of personal competence and the analysis of the task. One of the most perplexing issues in the measurement of efficacy beliefs is determining the level of specificity that is most helpful. Bandura (1986) suggested that self-efficacy beliefs should be assessed at the

optimal level of specificity that corresponds to the task being assessed and the domain of functioning being analysed. This idea implies that the best measure of efficacy is one that is the most appropriate for the research and study being conducted.

The Gibson and Dembo (1984) scale is an effective instrument designed to measure teacher perceptions and attitudes about themselves and their students (Jeck, 2009). The 30-item scale consists of a Likert scale where teachers rate themselves from 1 (*strongly disagree)* to 6 *(strongly agree)* to indicate their level of agreement with each individual statement (Gibson & Dembo, 1984). Personal Teaching Efficacy was identified as Factor 1 and General Teacher Efficacy was identified as Factor 2 in the study. According to Gibson and Dembo (1984, p.573), "all of the items included in Factor 1 reflect the teacher's sense of personal responsibility in student learning". Factor 2 represents the teaching efficacy, or belief that any teacher's ability to bring about change is significantly limited by factors external to the teacher, such as home environment, family background, and parental influence (Gibson & Dembo, 1984). Gibson and Dembo (1984) suggested that this dimension reflects the teacher's belief about the general relationship between teaching and learning and is represented by the second factor item.

These scales have also inspired researchers to develop and use similar instruments, especially subject-specific measures such as ones for teaching mathematics (Enochs, Smith, & Huinker, 2000), science (Cakiroglu, Cakiroglu, & Boone, 2005), or character formation (Milson, 2003).

2.6 Importance of Teacher's Sense of Efficacy

The concept teacher-efficacy has been in a position of prominence of many studies owing to the fact that through literature, the construct has established itself as enormously important. The importance of self-efficacy in effective job performance must not be underestimated. For instance, according to Protheroe (2008), the significance of a teacher's self-efficacy should not be questioned by teachers or administrators, because teacher's self-efficacy has been confirmed by researchers of self-efficacy to be a dynamic aspect of positive student academic achievement. This is why Mager (1992) theorised the concept of 'no self-efficacy and 'no performance'.

Linking to positive student academic achievement, teachers who display high self-efficacy will possess a higher enthusiasm to instruct students, and will be less likely to criticize students. Educational researchers have recognised teachers with a high self-efficacy produce higher student academic accomplishment in their classroom, higher student motivation to learn, and a positive attitude as it relates to students. Teachers who have an unusually high self-efficacy will have greater organisational skills; are keen to implement new academic learning strategies; are able to persist through tough academic sessions; are less likely to condemn students academically; and are less likely to not yearning to instruct students who are not understanding the academic material being presented in the classroom as well as the other students thereby providing the helpfulness students need which causes students to display more motivation to learn (Protheroe, 2008).

Henson (2001) stated students who have been instructed by teachers with a high self-efficacy will perform well academically as a result efficacy is contagious. Students who reciprocate their teacher's high self-efficacy through teacher/student

relations will be more interested to learn all academic material being presented in the classroom providing for greater student intellectual development. These students will create higher goals for themselves as they relate to their future student academic achievement, and will work to limit adverse external influences as they pertain to student academics.

Scholars have also found that teacher self-efficacy can be directly associated with a teacher's preparedness to embrace new ideas and to their use of varying instructional strategies (Turner, Cruz,& Papakonstantinou, 2004). Individual's with a high sense of teacher self-efficacy "are more feasible to use inquiry and student-centred teaching strategies, while teachers with a low sense of self-efficacy are more likely to use teacher-directed strategies such as lecture and reading from the text" (Swars, 2005, p.143). Teachers with low self-efficacy tend to lecture and use traditional methods while those with high self-efficacy will often group students together and allow students to search and guide their own learning. This communication and group work is serious as students often learn best by communicating with one another and by being exposed to an assortment of models (Turner et al., 2004). Additionally, teachers with a high sense of self-efficacy are more likely to try new strategies that may be dicey or hard to implement. Another study recognized that more efficacious teachers habitually used four or more instructional activities within a single instructional section in order to engage all their students (Zahorik, Halbach, Ehrle, & Molnar 2003). Again teachers with high prospects concerning their ability to influence student learning are more eager to experiment with instructional ideas and more likely to implement challenging strategies to achieve their goals with their students (Bruce &Ross, 2008). Teachers with higher efficacy use more effective classroom management tactics, encourage

student self-sufficiency, meet the needs of struggling students, and are able to positively influence students' perceptions of their abilities (Bruce & Ross, 2008).

Henson (2002) completed a meta-analysis of numerous studies on teacher efficacy and found that teachers with a higher sense of efficacy are more appropriate to demonstrate a number of excellent behaviours. These behaviours include using varied methods of instruction, seeking out innovative information on improved teaching methods, and experimenting with a variety of teaching material. Additionally, Deemer (2004) found that teachers with a higher sense of efficacy used instructional strategies that highlighted creativeness, comprehension, and meaningfulness. These highly efficacious teachers also stimulate others to use these same techniques.

Shidler (2009) explained that teachers with a high level of instructional efficacy believe more passionately in children's ability to be successful and dedicate more time and effort to teaching. Such teachers teach a subject more clearly and with a more interesting delivery, and produce better outcomes. If a teacher believes in himself, he is more able to self-reflect and change what he needs to change when the condition is gloomy.

A teacher's self-efficacy affects student/teacher interactions which involve instructional input, instructional feedback, and personal communications that are all essential for positive student academic achievement (Huitt, 2000). Teachers have ample control of their classrooms through their views and actions referred to as human agency. A teacher's human agency is what determines what academic learning strategies are initiated in their classrooms for the purpose of helping students cognitively improve. Teachers can have a great positive effect on student cognitive

development; therefore, human agency is essential for better student academic performance. Teachers who believe they can make helpful choices that will help in student's cognitive development will have a high self-efficacy creating a helpful effect on how a teacher interacts with students (Tschannen-Moran, Woolfolk-Hoy, & Hoy, 1998).

Students in the classroom distinguish when their teachers are displaying a high sense of self efficacy and when their teachers display a low self-efficacy. When acknowledgement has been established through teacher/student interactions that their teacher has a high self-efficacy students are more responsive in class, and are more eager to learn when their teacher implements new or old academic learning strategies (Tschannen-Moran et al., 1998).

A study with teachers in Venezuela found that those with high self-efficacy beliefs used active teaching strategies more frequently (Chacon, 2005). The survey study was conducted with 100 English as a Foreign Language teachers and found that teachers with high levels of self-efficacy used oral communications and grammar learning more commonly than those with lower levels.

Moreover, feedback is crucial to the persistent success and improvement of students. This potent instructional strategy increases learning outcomes in students (Marzano, 2007). Feedback, however, is only effective when it is given in a timely and formative manner. Too much time between the lesson and or assessment and the feedback has a serious effect on students' achievements. The longer the interval in giving feedback, the less likely students will respond to the feedback and the less likely learning will be boosted ((Marzano, 2012). Efficacious teachers deliver timely formative feedback (Marzano, 2012; Marzano, Pickering, & Pollock, 2001). They do

not give assessment just to add a grade in their grade book. Instead they use the information to monitor their instruction. They do more than just specify whether the answer is right or wrong. They give additional information so that students can learn from their errors.

Caprara, Barbaranelli, Steca, and Malone, (2006) found that teachers' sense of efficacy is related to job commitment and job satisfaction. Betoret (2006) confirmed this, showing that teachers with low self-efficacy face greater strain in teaching and higher level of anxiety, which can lead to poor relationship with students and lower levels of effectiveness (Kokkinos, 2007). Bogler and Somech (2004) and Ebmeier (2003) established that a higher sense of efficacy was a significant predictor of higher job commitment, which leads to greater engagement in the school organization. Thus, high self-efficacy is critical in guaranteeing that teachers do a better job in educating students.

Friedman and Kass (2002) considered teachers who have a very high classroom efficacy (HCE) and a high organizational efficacy (HOE). Teachers with HCE set high academic standards, exhibit confidence, create a climate of acceptance, are receptive, and relate to pupils' special needs. In addition, these teachers set clearer, higher, and more challenging goals for themselves and their pupils than other teachers do; they assume responsibility for their pupils' achievements and provide different kinds of feedback as circumstances demand. Furthermore, they believe in their pupils' abilities to learn, thereby supporting and strengthening students' confidence in their abilities to do so. Finally, such teachers are very more likely to bring their students to higher achievements effective in class (Caprara, Barbaranelli, Borgogni & Steca, 2003; Kass & Friedman, 2002; Tschannen-Moran & Woolfolk Hoy, 2007; Tournaki & Podell, 2005)

2.7 Teacher Efficacy and Teacher Characteristics

There are countless variables which may influence teacher self-efficacy. Akbari and Moradkhani (2010) categorised the variables under two broad categories, namely contextual and demographic factors. Contextual factors refer to specific background and environmental variables such as the principal's leadership, the school's climate, the colleagues, the students' characteristics. The demographic factors include variables such as teacher's gender, age, experience, and academic degree. Two of these variables are going to be looked at upon exhaustively.

2.7.1 Teacher Self-Efficacy and Teaching Experience

Researchers have suggested that self-reported efficacy may mean different things and lead to different understandings of survey items for novice and experienced teachers (Henson, 2001; Tschannen-Moran et al., 1998; Wheatley, 2005).Teacher efficacy is frequently changing. Most often, it develops with time and experience, but sometimes it reduces and gets worse, especially with teachers who may be pessimistic with their jobs or may be getting ready to retire. As earlier mentioned, Bandura (1977; 1986; 1997) believes mastery experience is the most important source of self-efficacy, implying that success and accomplishment can develop a strong sense of efficacy; whereas, failure can weaken it. Since throughout their years of teaching, teachers usually gain vast experience of successful and unsuccessful performances, this assumption has facilitated thorough research into how teachers who have had different lengths of teaching time perceive their teaching efficacy (Karimvand, 2011). According to Tschannen-Moran and Woolfolk Hoy (2007), it may be challenging to

establish the relationship of teachers' experience to their self-efficacy because the early exodus of less efficacious teachers may confound results.

According to Akbari and Moradkhani (2008) and Karimvand (2011), some studies have shown a positive correlation between years of experience and efficacy beliefs of teachers, in which seasoned teachers reported higher level of self-efficacy than their novice counterparts. For example, in Siaw-Marfo's (2011) study the significant difference in the rating between less experienced and experienced social studies teachers' self-efficacy perception in teaching social studies was determined using the two-tailed independent samples t-test. The descriptive statistics obtained indicated that experienced social studies teachers rated their level of efficacy as higher(M=94.26; SD=6.90) than less experienced social studies teachers(M=88.50; SD=11.27). The Levene's Test for Equality of variances was used to determine whether the difference in rating was significant. The test indicated that the variances for the two groups – less experienced and experienced social studies teachers were unequal ($F = 14.163$, $\rho < 0.05$), hence a test for unequal variances was used. The mean rating of experienced Social Studies teachers ($M = 94.26$, $SD = 6.90$) was significantly higher ($t = 3.104$, $df = 59.933$, two-tailed $p < .05$) than the mean rating of less experienced social studies teachers. This implies that there was a significant difference in the rating of social studies teachers' self-efficacy perception in terms of the number of years of teaching social studies

Fives and Buehl (2010) also examined the factor structure of the long and short forms of the Teachers' Sense of Efficacy Scale (TSES; Tschannen-Moran & Woolfolk-Hoy, 2001) for practicing ($n = 102$) and pre-service teachers ($n = 270$), comparing the responses to both forms of the TSES, and looked for differences in teachers' efficacy with respect to experience and grade level taught. Given the range

of experience of practicing sample (that is, 1–40 years; M age = 10.45 years; SD = 8.33 years), the authors examined the data for more fine-grained differences in teaching experience. The authors formed five groups, each based on the number of years that individuals had taught (e.g., pre-service, 1–2 years, 3–5 years, 6–10 years, 10+ years). For the pre-service and 10 or more year groups, the researchers randomly selected 20 individuals to create groups that were approximately equal in terms of length of service. Using years of experience as the independent variable, the researchers conducted two analyses of variance (ANOVAs) with the long and short forms' total TSES score, respectively, as the dependent variable. In each analysis, there was a significant effect for years of teaching experience-long form: $F(4, 101) = 3.48$, $p = .01$ $\eta^2 = .13$; short form: $F(4, 101) = 3.49$, $p = .01$, $\eta^2 = .13$. Follow-up post hoc analyses indicated that teachers with 10 or more years of experience were significantly more efficacious than were pre-service teachers, long form: $d = 1.72$; short form: $d = 1.74$.

Again Akbari and Moradkhan (2010) investigated possible relationships between experience/academic degree and teacher efficacy among English as a Foreign Language (EFL) teachers. Four hundred and forty-seven teachers (96 male and 351 female) who participated in this study filled in a survey which included some demographic information as well as Teacher Self-Efficacy Scale (TSES). Their teaching experience ranged from 1 to 25 years (mean=3.65, SD=3.33). The results of data analysis showed that experienced teachers (with more than three years of teaching experience) had a significantly higher level of global efficacy, efficacy for student engagement, efficacy for classroom management, and efficacy for instructional strategies compared to their novice counterparts.

Kim, Sihn, and Mitchell (2014) examined South Korean elementary teachers' Mathematics teaching efficacy beliefs (MTEB) and what factors increase their efficacy beliefs. A translated and adapted version of the Mathematics teaching efficacy belief instrument was used to gather information on teachers' Mathematics teaching efficacy beliefs and their background information (n=283). A one-way ANOVA was used to test for differences in mean MTEB of scores among five groups of teachers that had teaching experience of 0–5 years, 6–10 years, 11–15 years, 16–20 years, and more than 21 years. Teaching experience differed significantly across the five groups (F = 16.15, P<.001). Post hoc tests using the Bonferroni correction revealed that the 0–5 teaching experience range group had a statistically significantly lower mean of MTEB scores than did the 6–10 year range group (P <.001), 11–15 years range group (P <.001), and 16–20 year range group (P = 0.007).

Nikoopour, Farsani, Tajbakhsh, and Kiyaie, (2011) investigated the influence of English as a Foreign Language (EFL) teacher' age, gender, and years of teaching experience on trait emotional intelligence and self-efficacy. A total number of 336 (102 male, 228 female) Iranian EFL teachers were asked to reply the trait EI and self-efficacy questionnaires. Their ages and years of teaching experience range from19 to 60 (M=28.60, SD=6.86) and 1-27 years (M=6.04, SD=4.99) respectively. The ANOVA analysis revealed a strong effect of teaching experience on teachers' self-efficacy ($F(2,243) = 7.17$, $p<0.05$, $\eta^2=0.056$). As teachers with 8 and above years of teaching experience have the highest level of self-efficacy (M=94.48, SD=2.2) followed by teachers of 4-7 years of teaching experience (M=87.67, SD=1.28) and next teachers with 1-3 years of teaching experience (M=84.37, SD=1.5)

Ghasemboland and Hashim (2013) explored self-efficacy beliefs among English as Foreign Language teachers in the language Centre's in one selected

Middle-East country. Data were collected through a survey administered to 187 teachers. The Teacher Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001) was used to assess efficacy for management, engagement, and instructional strategies. Results showed that the more experienced the teachers were, the more efficacious they considered themselves to be. Though, the correlation was stronger with Student Engagement ($r = 0.834$, $p < 0.001$). It meant that more experienced teachers engaged students more than less experienced ones.

Klassen and Chiu (2010) examined the relationships among teachers' years of experience, teacher characteristics (gender and teaching level), three domains of self-efficacy (instructional strategies, classroom management, and student engagement), two types of job stress (workload and classroom stress), and job satisfaction with a sample of 1,430 practicing teachers using factor analysis, item response modelling, systems of equations, and a structural equation model. Teachers' Self-Efficacy Scale (TSES) short form by Tschannen-Moran and Woolfolk Hoy (2001) was used to collect efficacy data whiles job satisfaction was measured with two items from Caprara et al. (2003) on a 9-point scale. Items consisted of (a) "I am satisfied with what I achieve at work," and (b) "I feel good at work." Teachers' years of experience proved nonlinear relationships with all three self-efficacy factors, increasing from early career to mid-career and then falling afterwards.

Yeo, Ang, Chong, Huan, and Quek (2008) studied the efficacy of Singapore teachers who taught low achieving adolescent students. They studied three dimensions of teacher efficacy, namely, instructional strategies, classroom management and student engagement in relation to teacher traits and teacher-student relationship. Data were obtained from the Teacher Self-Efficacy Scale (Tschannen-Moran & Woolfolk Hoy) and the Teacher- Student Relationship Scale. The study

revealed significant differences between novice and experienced teachers in teacher efficacy beliefs in relation to instructional strategies, classroom management and student engagement.

A study by Liu, Jack, and Houn-Lin (2007) showed that Taiwan in-service elementary teachers who have 11 or more years of teaching experience had a higher score on the Personal Science Teaching scale and the Science Teaching Outcome Expectations Efficacy scale than teachers who have one to ten years of Science teaching experience. This shows that the teaching efficacy one obtains through the years of general teaching can affect a domain specific area, such as Science or Mathematics.

Experienced teachers generally know more about the content they teach, have different attitudes regarding their students, and behave differently in the classroom than novice teachers do (Wolters & Daugherty, 2007). Blackburn and Robinson (2008) suggested that experienced teachers' mastery experiences should allow them to perfect their preferred learning styles. Tschannen-Moran and Hoy (2007) stated that experienced teachers may develop higher self-efficacy due to the real successes they experience with students in the classroom.

Wolters and Daugherty (2007) also found that teachers with additional years of experience felt more poised in their ability to employ instructional and assessment practices that would benefit even the most difficult students. More experienced teachers were also reported to have greater confidence in their ability to avoid classroom interruptions and provide adequate classroom management. Hoy and Tschannen-Moran (2007) concluded that experienced teachers exhibit higher mean scores of self-efficacy than novice teachers. Where research exists to corroborate that

experienced teachers have higher levels of self-efficacy, many researchers suggest this could be because all of the lower level teachers have already left the profession (Hartfield, 2011; Swan, Wolf, & Cano, 2011).

Wolters and Daugherty (2007) found that teachers with additional years of experience felt more confident in their ability to employ instructional and assessment practices that would benefit even the most difficult students. More experienced teachers were also reported to have greater confidence in their ability to avoid classroom disruptions and provide adequate classroom management. Hoy and Tschannen-Moran (2007) concluded that experienced teachers exhibit higher mean scores of self-efficacy than novice teachers.

Berliner (2001) supported these findings by trusting that it is only through experiencing the complexity of the classroom did a teacher learn and improve instructional techniques. Berliner (2001:7) stated clearly that experienced teachers had more skills than did inexperienced teachers, "We have verified that it takes between five and eight years to master the craft of teaching". Experienced teachers with five or more years of experience had significantly higher efficacy for instruction and management (Tschannen-Moran & Woolfolk-Hoy, 2002). It was more difficult to influence the personal teaching efficacy of experienced teachers, as beliefs are solidified with experience and time (Henson, 2001; Tschannen-Moran et al., 1998).

However, some other studies have reported results which: (1) contradicted the ones reported above, (2) showed mixed results, or (3) showed no significant relationship between teacher's years of experience and their efficacy beliefs. For instance Chacon (2005), explored self-efficacy beliefs among teachers of English as Foreign Language in selected schools in Venezuela. Data were collected through a

survey administered to 100 teachers. The Teacher Sense of Efficacy Scale (Tschannen-Moran & Woolfolk-Hoy, 2001) was used to assess efficacy for management, engagement, and instructional strategies. Interviews were conducted with a purposeful sample. From the population 60% were females, 30% males and 4% no indication. Forty percent of the respondents had been teaching for 6–12 years. Twenty-six percent reported teaching between 13 and 20 years while other 26% reported having less than 5 years of experience. A small percentage (8%) reported more than 20 years of teaching experience. The data showed that there were no relationships between perceived efficacy for engagement, instructional strategies, and management and years of English teaching experience.

In a study conducted by Desouza, Boone, and Yilmaz (2004) among elementary and middle school teachers in urban schools in India, using the STEBI-A, it was established that although the number of years of teaching Science was important, it did not necessarily help teachers feel confident about teaching the subject. The main reason was that Indian teachers of Grades 1 - 5 were unable to become Science subject experts. Besides Science, the Indian elementary teachers also taught other core subjects. Thus, Desouza et al concluded that the number of years of Science teaching experience was not synonymous with being an efficacious teacher. Teacher efficacy is context and subject matter specific. Therefore, teachers who are subject experts have a higher sense of teacher efficacy.

Zarei and Afshari (2014) investigated the views of experienced and novice teachers as to the effect of extrinsic factors (classroom management, instruction, need of students, technology) on teacher efficacy, 53 experienced teachers who had more than 10 years of experience in teaching and 46 novice teachers who had less than 3 years of experience in teaching participated in the study. To accomplish the aim of the

study, a 30-item general proficiency test and an 80-item questionnaire measuring the perceptions of the teachers about one of the extrinsic factors, were administered to all participants. The data gathered were analysed through Mann Whitney U procedure. Results showed that there were no significant differences between experienced and novice teachers' perceptions as to the effect of classroom management, instruction, and technology on teacher efficacy. But significant differences were observed between the perceptions of novice and experienced teachers with regard to the effects of need of students on teacher efficacy.

Ghaith and Yaghi (1997) investigated the relationships among teachers experience, efficacy and attitudes toward the implementation of instructional innovation. Data were gathered through Gibson and Dembo (1984) 16 item self-report which was administered to 25 (twenty females and five males) teachers immediately following a four day development programme on cooperative learning. The results showed that teachers' experience was negatively correlated with the sense of general teaching efficacy $r = 0.50$ and to their ratings of the importance of implementing instructional innovation $r = 0.57$.

Ghaith and Shaaban (1999) investigated the relationship between teacher characteristics (gender, grade level taught, and experience), personal and general teacher efficacy, and the perception of teaching concerns. Participants included 292 Lebanese teachers from diverse school backgrounds with a wide range of teaching experience. Teachers' sense of efficacy was measured through the Gibson and Dembo standard teaching efficacy scale (1984) whereby participants responded to 16 six-point agree/disagree statements. All statistical tests used to address the questions in the study used 0.05 as alpha level. Results indicated that experience and personal efficacy were negatively related to the perception of teaching concerns. The results

also revealed that beginning teachers and those with low sense of personal efficacy were concerned about the task of teaching and the impact they make as teachers more than their highly experienced and more personally efficacious counterparts. This is because from a cognitive perspective, novice teachers' thinking is typically characterized as focused on retrieval of pedagogical strategies that have yet to become automatized. In complex and cognitively demanding situations such as teaching, novice teachers may be more likely to focus on their own behaviours (How should I teach in this situation?) rather than on actual student outcomes (How are students responding to my teaching?), as a means of reducing the complexity of the classroom (Feldon, 2007).

Another reason for this lack of novices' attention to student learning outcomes is that it depends on the skill to elicit student thinking and interpret such thinking with accuracy. Such skills develop over time but can also be taught to novices with explicit support and teaching (Ball & Forzani, 2010; Coffey, Hammer, & Levin, 2009; Thompson, Windschitl, & Braaten, 2013). Gabriele and Joram (2007) found in a think-aloud study that, relative to more experienced teachers, inexperienced elementary teachers focused less frequently on evidence of students' thinking to judge their success. With support from teachers, Mulholland and Wallace (2001) documented one novice's shift to focusing on 51 student learning outcomes. While the authors attributed this change to changing expectations for student on-task behaviour, it is also possible that the support of the more experienced teachers around her facilitated her skill at interpreting student thinking. Importantly, these studies were conducted in the context of reform-oriented mathematics classrooms that provide explicit support for developing student thinking. In such an evaluation, their perceived level of pedagogical knowledge—knowledge of teaching strategies—might

be a more salient factor in their efficacy judgments. In other words, capability to generate a lengthy inventory of strategies may lead to a higher sense of efficacy even if those strategies have not yet been successful in bringing about desired student outcomes. On the contrary, other scholars have suggested that novices may base their efficacy judgments on what they believe is possible rather than what they know how to do (Tschannen-Moran et al., 1998).

Garcia-Nevarez, Stafford, and Arias (as cited by Pettit, 2011) showed that years of experience teaching was negatively correlated with teacher attitude toward his or her students' native language. More specifically, they found that teachers who taught seven or more years were more probable to feel less efficacious in the classroom. Qualitative analysis revealed that these attitudes were due to resentment over years of modifying curriculum to meet unique student needs. Therefore, it might be difficult to conclude that there is a similar direction regarding the relationship of the two variables; teacher perceived efficacy and teaching experience and this calls for further research.

2.7.2 Teacher Self-efficacy and Gender

Gender is another demographic variable that might influence teacher's professional lives. On reviewing the studies which have focus on the relationship between gender and teachers' sense of efficacy, a great number of discrepancies can also be seen.

No differences in gender were found in teacher efficacy beliefs in some studies. For instance, Ansong (2013) used survey method to determine gender differences in teachers' personal financial concerns and self-efficacy in teaching and dealing with personal finance pedagogy among Senior High School teachers in

Ghana. Way and Holden (2009) instrument was adapted to collect data. The sampled teachers had the following characteristics: nearly forty-nine percent (48.7%) of the respondents were female while fifty-one percent (51.3%) were male. Majority of the respondents were married (78%). Respondents were young and somewhat experienced. The sample had a median age of 38 and a median of 12 years of teaching experience. Almost all held a bachelor's degree, and only about 4% held a higher degree (that is masters or PhD degrees). Respondents represented varied disciplinary teaching assignments. Disciplines represented included business, Mathematics, sciences, social studies, vocational/technical education, home economics, general and visual arts, and English language. In sum, only twenty percent taught business related courses while about eighty percent (80%) taught non-business related courses. The results indicated that, on the whole, there were no gender differences based on the broad constructs.

Siaw-Marfo (2011) designed a study to determine the self-efficacy perceptions of Social Studies teachers in relation to the teaching of Social Studies in Senior High Schools in the Greater Accra Region of Ghana. The study was a descriptive survey. Multistage sampling procedure was employed to select a sample of 153 Senior High School Social Studies teachers. Descriptive and inferential statistics were employed to analyse the data. In addition an independent sample t-test was employed to test four hypotheses that were formulated. The descriptive statistics attained indicate that the mean rating of male social studies teachers was higher than the mean rating of female social studies teachers. This gives the impression that male social studies teachers regarded their level of efficacy higher than female social studies teachers. The Levene's Test for Equality of variances indicated that the variances for the two groups – male and female social studies teachers were equivalent ($F = 1.444$, $\rho > 0.05$), hence

a test for equal variances was used. The mean rating of male social studies teachers (M = 92.80, SD = 8.374) was not significantly higher (t = .956, df = 128, 2 – tailed p<.05) than the mean rating of female social studies teacher. This implies that there was no significant difference between male and female social studies teachers' self-efficacy perception in teaching social studies

Murshidi, Konting, Elas, and Fooi (2006) conducted a study to investigate beginning teachers' sense of efficacy level in relations with demographic variables (gender, race, and types of teacher preparation programme) as well as to investigate interactions between demographic variables. They used the Teacher Self-Efficacy Scale (TSES) of Tschannen-Moran and Woolfolk-Hoy (2002). The original version of TSES was translated into the Malay version. The participants included 328 beginning teachers (100 male and 228 female). Murshidi et al. (2006) found that there were no significant difference between male and female teachers' overall sense of efficacy, instructional strategies efficacy, classroom management efficacy, and student engagement efficacy.

Isler and Cakiroglu (2009) investigated primary school and Mathematics teachers' efficacy beliefs and perceptions in the context of a new primary Mathematics curriculum in Turkey and identify differences, if any, in teachers' efficacy beliefs and perceptions based on their area of certification, gender, and experience. The sample consisted of 805 teachers, 696 of whom were primary and 105 of whom were Mathematics teachers working in elementary schools located in 5 cities of Turkey. The results of the MANOVA analysis indicated that teachers' area of certification and experience had a significant role on the collective dependent variables, gender did not.

Again, Tejeda-Delgado (2009) examined teacher efficacy and teacher tolerance, along with teacher gender, and their relationship with the number of students teachers referred to special education. A total of 676 surveys were sent to teachers via in-school mail within an urban school district in the State of Texas. Grade levels taught by participants ranged from the first through the fifth grade. Out of the 676 surveys sent to teachers, 167 surveys were returned, for a response rate of 24%, deemed acceptable by Gall, Gall, and Borg (2003). As would be expected, given that this sample of teachers was taken from elementary schools, that 152 (91.0%) were females and 15 (9.0%) were males. A one-way ANOVA was conducted to evaluate the relationship between teacher efficacy and teacher gender, with the independent variable being teacher gender and the dependent variable being the teacher efficacy score. This ANOVA was not statistically significant, $F(1, 160) = 0.341$, $p > 0.05$. Thus, the level of teacher efficacy did not differ according to teacher gender.

Senemoglu, Demirel, Yagci and Ustundag (2009) also studied elementary school teachers self-efficacy beliefs concerning teaching behaviours and whether or not self-efficacy beliefs differed on the basis of gender, teaching experience and the achievement level of schools where teachers works. In consequences, teachers' average of self-efficacy belief scores was found to be at a "good level". The fact that the teachers self-efficacy belief was found to be high showed that they held a strong belief that they had knowledge and skills of effective teaching behaviours. No significant differences were found between self-efficacy belief score averages and gender.

Hosseinchari, Samavi, and Mohammadi (2011) explored the psychometric properties of teacher Self- Efficacy Scale in Iran. The researchers used a descriptive survey method and the population consisted of male and female teachers of

elementary and secondary schools in Bandar Abbass. A sample of 252 elementary and high school teachers (128 female and 124 male), who were selected via random cluster sampling procedure, participated in the research. Teacher self-efficacy scale (Tschannen-Moran & Woolfolk, 2001) was used for data collection in this study. Overall results indicated that teacher self-efficacy scale is appropriate to measure teachers' self- efficacy and its dimensions in Iranian culture. Furthermore, findings showed that there was no significant difference among male and female teachers in terms of their sense of self- efficacy.

Ghonsooly, Khajavy, and Mahjoobi (2014) explored the degree of in-service Iranian English teachers' sense of self-efficacy and meta-cognitive awareness to predict their academic performance. The participants of the study were 101 Iranian English as a Foreign Language (EFL) student teachers (47 male and 54 female). Their years of teaching experience ranged from 1 month to 12 years. They had been teaching EFL for at least 12 hours a week since they had started their career. All the participants were undergraduate student teachers at a university for teacher education in Mashad. The results of the samples t-test showed that there was no significant difference between male and female teacher trainees' self-efficacy and meta-cognition.

Bilali (2013) did a study to determine the level of sense of efficacy among student teachers' in the Faculty of Education, Elbasan, Albania. Some variables such as gender and type of diploma were tested to identify their impact on the teacher efficacy. Data were collected using a 12-item Teacher Sense of Efficacy Scale, TSES (short form), developed by Tschannen-Moran and Woolfolk (2001). Participants in this study were 243 students of the Faculty of Education, University "Xhuvani Aleksander", Elbasan, Albania. Students were aged 19-25 years, average age 22

years. Of these 88% were female and 12.0% male. Enrolled in the program "Elementary Teacher" were 39.8% students and 54.1% students were enrolled in "Preschool Teacher". Inferential statistics, independent sample t-test was used to determine the difference in efficacy between the groups regarding gender and the result showed that no significant differences in the level of sense of efficacy between men (M = 6.85) and women (M = 6.74), the difference is small (MD = 0.11).

Al-Alwan and Mahasneh (2014) examined teachers' self-efficacy as a determinant of students' attitudes toward school. Over 679 teachers and 1820 students in 23 Jordanian (primary and junior) schools were selected using simple random sampling. The instrument used in this study was Norwegian teachers' self-efficacy scale which was developed by Skaalvik and Skaalvik (2007) and students' attitudes toward school scale which was designed by the researchers. Results showed no significant differences between male and female teachers in their level of self-efficacy.

Sridhar and Badiei, (2008) examined and compared the teacher efficacy of higher primary school teachers in India and Iran by surveying 225 Indian teachers and 222 Iranian teachers. Teachers' sense of efficacy was measured through the Woolfolk and Hoy standard Teacher-Efficacy Scale (1990). Results revealed that there were no significant differences between general teaching efficacy mean scores of female teachers (Mean=4.44) and male teachers (Mean=4.48) neither in the overall data set $F(1) = 0.254$, nor when compared as a function of country $F(1) = 0.026$.

However, there were differences in self-efficacy scores between genders in other studies. Aremu and Fasan (2011) examined computer self-efficacy of teachers in Nigerian secondary schools and also to determine the extent to which gender

influences the computer self-efficacy of the teachers. Five hundred and eighty nine teachers were asked to indicate their belief in their capability in the use of computers. Students t-test analysis showed that there was a significant difference between male and female teachers in their computer self-efficacy ($t=3.041$; $df =587$; $p<0.05$). The mean scores show that female teachers have higher self-efficacy score ($M=34.69$) than their male counterparts ($M =33.28$).

Aktaş, Kurt, Aksu and Ekici (2013) examined the relation between biology teachers' education process self-efficacy perception, perception of responsibility from student success and gender and experience in Ankara**.** A total of 82 biology teachers participated in the research. At the end of the research, the level of biology teachers' education process self-efficacy perception and the level of perception of responsibility from student success were found as medium. On the other hand, the results of the regression analysis showed that both gender and experience variables positively and significantly predict education process self-efficacy perception and perception of responsibility from student success.

A study was conducted by Akpochafo (2012) to investigate self-efficacy and some demographic variables as predictors of occupational stress among primary school teachers in Delta State by using a sample of 120 randomly selected male = 29, female = 91) primary school teachers. The age range of the participants in the study was between 21 and 55 years. The subjects' years of experience were between 1 and 34 years. This study used a self-report measure in which two instruments General Perceived Self-Efficacy Scale (GPSS) and Occupational Stress Scale (OSS) were utilized. In the self-efficacy beliefs, stress and gender of teachers indicated that the mean of male self-efficacy of 48.55 was less than the mean of female self-efficacy of

48.75 which implies that the females had high self-efficacy than their male counterparts.

Khurshid, Qasmi, and Ashraf (2012) conducted a study to determine the relationship between teacher self-efficacy and their perceived job performance. In this study measurement of teachers self-efficacy, Teacher Efficacy Scale consisted of 16-items modified by Hanif was used (2007). A random sample of 75 male and female teachers was selected from Federal Government Schools of Islamabad. Among them 40 were male and 35 were female secondary school teachers. Results of the study revealed that there is a positive relationship between teachers' self-efficacy and their job performance. As far as difference in the teachers' self-efficacy due to demographic variations are concerned results of the study revealed that female secondary school teachers had higher self-efficacy than male teachers.

Another study was the measurement of teacher efficacy of Hong Kong primary in-service teachers which was conducted by Cheung (2006). The instrument was the short version of Teacher Self-Efficacy Scale (TSES) (12 items). The scale was adapted before in Kennedy and Hui's (2006) study and was found to be two factors: efficacy in learning and teaching (8 items), efficacy in classroom management (4 items). Efficacy in teaching and learning was called general teacher efficacy. In the scale, the information about background of the teachers, school level taught, gender, age, and years of teaching experiences were included. The participants were 725 primary school teachers. Cheung (2006) reported that female teachers had higher general teacher efficacy than male teachers.

Andersen (2011) studied whether (and why) female teachers in Danish schools had different teacher self-efficacy and job satisfaction than male teachers. Based on a

survey with 3439 teachers from 85 Danish schools, it was shown that female teachers had higher self-efficacy and job satisfaction, and that these gender differences somewhat explain by the female teacher's higher level of empathy. The differences between male and female teachers did not, however, depend on the proportion of female teachers at the specific school or on the gender of the school principal.

Fives and Looney (2009) investigated the relations of teacher- and collective efficacy with a series of variables: experience, professional level, age, gender, academic domain (for teacher-efficacy only), and academic department (for collective-efficacy only) as well as the relationship between collective- and teacher-efficacy. Data from 117 graduate students, lecturers, and faculty (54 of the participants were male and 63 were female) were analysed. The variable of teacher-efficacy was measured using a 19-item adaptation of an early version of the Ohio State Teacher-efficacy Scale (OSTES, Tschannen-Moran & Woolfolk, 2000), now referred to as the Teacher Sense of Efficacy Scale (TSES, Tschannen-Moran & Woolfolk, 2001). The results of the analyses showed that males and females in this sample differed significantly in their levels of efficacy for student engagement $F(1, 116) = 8.085$, $p = 0.005$, eta sq = 0.07), and overall efficacy ($F(1, 115) = 10.253$, $p = 0.002$, eta sq = 0.08), with females reporting higher levels of efficacy in each area.

Yet other studies indicate that male teachers had high self-efficacy than female teachers. Butucha (2013) investigated secondary school beginning teachers' perceptions of self-efficacy in Ethiopia. With respondents of 381 secondary school beginning teachers in East Shoa and West Arsi Zones of Oromiya regional state in Ethiopia who responded to two-part questionnaire-demographic variables, and the teachers' sense of efficacy scale (Tschannen-Moran& Woolfolk, 2001). The analysis revealed that there were significant differences in self-efficacy in instructional

strategies ($t = 3.20$, $p < 0.01$), self-efficacy in student engagement ($t = 2.40$, $p < 0.05$), self-efficacy in classroom management ($t = 3.26$, $p < 0.01$), and overall efficacy ($t = 3.31$, $p < 0.01$) with males scoring significantly higher than females. It can be concluded from this study that female teachers' perceptions of self-efficacy is consistently and significantly lower than their male counterparts.

In Ghasemboland and Hashim (2013) study the teachers' gender had a stronger relationship with Classroom Management ($r = 0.486$, $p < 0.001$) than Instructional Strategies ($r = 0.343$, $p < 0.001$) or Student Engagement ($r = 0.273$, $p < 0.001$) but the magnitude was moderate. The direction of the correlations indicated that male teachers considered themselves more efficacious than female teachers in all three dimensions of self-efficacy and they were more confident in managing their classrooms than females.

Tajeddin and Khodaverdi (2011) also investigated the relationship between English as a Foreign Language (EFL) teachers' expectation of their efficacy and three teacher variables of gender, years of experience in EFL teaching, and relatedness of their education to ELT. The participants who took part in this study were EFL teachers. As many as 59 teachers took part, 28 of whom were female and 31 were male. The range of their experience of teaching English as a foreign language was between one to more than 5 years. This study used the questionnaire called Teachers' Efficacy Beliefs System-Self Form. The first research question concerned the effect of gender on teachers' efficacy. The means of efficacy for male and female participants were rather high, ranging from 3.71 to 4.28. Male teachers reported stronger efficacy beliefs than female teachers. This stronger perception was found to apply to all sub-scales of efficacy.

Seema (2012) used 1normative survey method to study the main effects of gender, academic stream and teaching experience on Occupational Self-Efficacy, Job Satisfaction and Attitude towards Teaching Profession among teachers. A multi-stage random sampling technique was used to select the sample of 240 (120 males and 120 females) teachers working in teacher training institutions. Significant difference was found in occupational self-efficacy between male and female teachers. It was revealed that male teachers had more occupational self-efficacy than female teachers. Imants and De Brabander (1996), using a modified version of the Teacher Efficacy Scale (TES), concluded that gender influences teachers' self-efficacy. More precisely, their results showed that male elementary teachers' level of efficacy beliefs for pupil-oriented and school-oriented tasks seemed to be higher than their female counterparts.

From all the results of the studies, it is observed that there is no clarity about whether the self-efficacy differs according to gender and the difference in the results of the studies may result from cultural differences (Azar, 2010).

2.8 Perceived Usefulness of Mathematics

Perceived usefulness talks about to the degree to which a person believes that using a system would enhance his or her job performance or contributing meaningfully in society (Davis, 1989).This follows from the definition of the word useful: "capable of being used advantageously". A substantial body of prior research has revealed that perceived usefulness has a positive effect on behavioural intention to use (Venkatesh, 2000; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000). Adams, Nelson, and Todd, (1992) also argues behaviour is strongly affected by perceived usefulness.

There basically cannot be any significant improvement in almost all areas of life without the knowledge of Mathematics. Again, development in almost parts of life is grounded on definite knowledge of Mathematics. Mathematics is one of the subjects that is very vital all over the world as much as education is concerned. In all the entire history of education, Mathematics has held its main place among all other school subjects for the reason that it has been considered as a vital tool in the realization of the educated man. As said by Griffiths (1974), the educated man, is the knowledgeable man, trained to approach the activities of his daily life with sense of fairness and objectivity and to reason about them thoughtfully and properly. Mathematics is the only subject that can be used in all cultures of the world to create the educated man. Mathematics is the means of enlightening the individuals mind, shaping his reasoning ability and developing his personality. It has helped to add immensely to the education of the people of the world. A thorough understanding of Mathematics is an asset, if not essential, for candidates interested in gaining better occupation the world over. In other words, mathematical know-how is an indispensable element in preparing numerate citizens for employment and it is needed to ensure the continued production of highly-skilled persons required by industry, science and technology (House, 2006; Mikulski 2001).

Hammouri (2004) studied self-perception of maths value and found it significantly correlated with maths achievement ($r = 0.24$, $p < 0.05$). Students see Mathematics as an important subject for the following reasons:

1. Mathematics is useful in daily life
2. Mathematics is important for some other subjects
3. Mathematics can help to solve world problems
4. Mathematics helps them to get careers

5. Mathematics is important for many courses at university
6. Mathematics is thought to teach logical thinking

Thomaskutty and George in Agwagah (2008) admitted seven educational ideals of Mathematics to include, Practical or Utilitarian values, Disciplinary values, Cultural values, Social values, Moral values, Aesthetic values and Recreational values. As stated by Asafo-Adjei (2005) (cited in Churcher and Adjabui.2014), Mathematics is a field that deals with the way of finding answers or explanation to problems and thinking for ourselves using the knowledge of probability, statistics, shapes and measurement in everyday life, for instance, gauging the right amount of water for mixing a sachet of Oral Rehydration Salt (ORS). According to Osofechinti in Odili (2006), the importance of Mathematics to individuals in their daily enterprise is so huge that the knowledge of Mathematics is an essential tool for an effective and balanced human existence on earth. Mathematics helps man to polish his understanding and definition of religious concepts. Such concepts as eternity, heaven, spirit life, power, salvation, wisdom, strength, light, hope, faith, righteousness, glory, blessing, truth, grace, peace, neighbour, sun and death can each be defined with mathematical diligence and correctness (Osah-Ogulu & Odili, 2000).

According to Thomaskutty and George (2007) (as cited by Agwagah (2008), mathematics cannot be considered as a classroom subject only. Emphasising on this, James (2005) showed that not only an academician, a scientist, an engineer, but a shopkeeper, a grocer, a housewife, a sportsman, and an employee needs Mathematics, and who does not need it? A common man can get on sometimes very well without learning how to count and calculate (Agwagah, 2008). The author additionally highlighted that apart from an engineer, a businessman, an industrialist, a banker, even a labourer has to calculate his wages make purchases from the market, and

regulate the expenditure to his income. As simple arithmetic skills are required for everyday computations and sometimes for job applications, young people who come to adulthood without mathematical skills are likely to find it difficult to function in society (Kirch, Jungeblut, Jenkins, & Kolstad, 1993). In line with Milgram (2007), "our society could not even function without the application of a very high level of mathematical knowledge".

Consistent with Odili (2006), the cherished aspect of Mathematics in preparing students for useful living include counting, notations, addition, subtraction, multiplication, division, weighing, measuring, selling and buying. Every student on finishing secondary education should have rich knowledge of numbers and a comprehension of both the very large and the very small numbers. Students should understand the way number is applied to measure lengths, volume, weight, area, density, temperature, speed, acceleration and pressure. Estimation and approximation helps them to check economic waste in daily life. Odili (2006) additionally emphasised that economy of modern living and the technology of modern selling requires a housewife to be able to estimate quickly which of two different prices offers, sizes or measures is the better to buy and to be able to see through many of the tricks of the trade.

There is the shared belief that Mathematics affords a model of precise, abstract and smart thought and that the study of the subject helps to increase and improve one's intellectual proficiencies (Ebiendele, 2011). The author further stated Mathematics helps the individual to comprehend his environment and to give precise account of the physical occurrences that happen around him and that the learning of Mathematics helps to train the mind in the same mode that the learning of Latin

Grammar or French irregular verbs have been claimed to train the mind to think sensibly.

Mathematics is again one of the crucial aids by means of which the other sciences, pure and applied are able to forge ahead. According to Ebiendele (2011) Mathematics has been branded as the queen and as well as the handmaid, the master and servant of the sciences because of the leadership and service roles it plays. The author goes further to state that studies have shown that no other subject forms a strong binding force among various branches of science, namely Physical, Biological and social as Mathematics and without it, knowledge of the sciences often remains superficial. Once more, Odili (2006) continued that achievement in sciences is often reliant on Mathematics knowledge and the ability to perform mathematical operations. Although physics and Mathematics form different disciplines in institutions, the separation is not any more clear-cut than that between certain fields of Mathematics (Ihejieto in Odili, 2006). At the early school stage, physics students are involved in measurement of length, area, volume and masses. To do these with adroitness, calculations, for which a good knowledge of Mathematics is essential, are needed.

Ingle and Turner in Odili (2006) in their study on Mathematics and chemistry at the O'level argued that the pattern of thought used in articulating some scientific concepts is equal to that used in some specific mathematical concepts. Adetula (2002) also maintained that Mathematics can be used in medicine. Functional numeracy is an important tool to an aspiring medical professional as functional literacy. Mathematics skill required in medicine include basic mathematical knowledge sufficient to calculate drug doses, concentrations, an understanding of the core statistical concepts most commonly represented in the medical literature, knowledge of Algebra to

understand calculations of acid-base status ability to appreciate whether or not results are mathematically plausible (Adetula, 2002). For instance in the words of Akesode (2000) (as cited in Utubaku, & Aniah-Betiang 2011) from identification of diabetes through paternity testing by means of DNA to testing for HIV position, the language is Mathematics. From a slight surgery of stitching an ulcer to a major brain surgery or organ transplant, Mathematics has a place particularly with regard to precision of measurement.

Ebiendele (2011) further states in social science, Mathematics plays a commanding role in understanding most of the concepts and theories, especially as they relate to everyday occurrences. For example in Geography, Mathematics is employed in the measurement of distances and areas which are used in map forecasts. The laws governing the heavenly bodies are mathematically deduced.

According to Alcock, Cockcroft and Frank-Finn (2007), successful completion of secondary Mathematics increases successful performance in Business programmes at the tertiary level. Business programmes in this case include Accounting, Finance, Economics,Quantitative Methods, Information Systems and Actuarial science.

The application of Mathematics in law is not used in straight forms as in other disciplines. The principle of Mathematics reasoning forms the basis for its understanding. Prospective law students with Mathematics background perform better. Such areas as ownership right, power, justice, crime, guilt, trial, conviction, evidence, suspect, constitution, charge, offence count, liability, civility etc. are now defined with mathematical precision (Gemignani, 1979). Consequently, the influence of Mathematics in law shows up in the high performance and great status enjoyed by the mathematically literate law firm.

In addition, self-efficacy has been studied vigorously as a factor that mediates the effect of other determinants of mathematics accomplishment (e.g., perceived usefulness of mathematics, and mathematics anxiety). Furthermore, perceived usefulness of mathematics is among personal variables that are related to mathematics performance (Armstrong, 1985 cited in Pajares & Miller, 1994). The research findings of Pajares and Miller (1994) revealed that the relationship between performance and perceived usefulness of mathematics was largely a result of the covariation between these variables and math self-efficacy, i.e., mainly due to the effect of self-efficacy and perceived usefulness of mathematics.

2.9 Chapter Summary

In this chapter, various definitions of self-efficacy and teacher self-efficacy have been given. The chapter has reviewed literature also on characteristics of high and low efficacy teachers, as well as dimensions of high and low efficacy teachers.

The majority of the self-efficacy literature indicates that the more self-efficacy an individual has, the better that person will be able to perform (Ross 1998, Lorsbach & Jinks, 1998, Chen, 2006). Literature has also been reviewed on importance of self-efficacy as well as gender and experience on teacher efficacy. On the importance of self-efficacy research has shown that teacher efficacy has positive effects on: teacher effort and persistence in the face of difficulties (Podell & Soodak,1993; Gibson & Dembo, 1984);the implementing of new instructional practices (Evers, Brouwers, & Tomic, 2002. Once more, throughout the literature, studies show inconclusive results with regard to gender differences and efficacy (Evans & Tribble 1986, Gencer & Cakiroglu, 2007, Taimalu & Oim, 2005). Again, the literature seems inclusive as one

tries to see the relation between teachers' experience and their efficacy beliefs. Some of the researchers have come to the conclusion that teaching experience has nothing to do with teacher self-efficacy (Chacón, 2005; Gaith & Shaaban, 1999. Campbell (1996) on the other hand claimed that older teachers feel more efficacious. Moreover, studies that reported on perceived importance of mathematics have been reviewed. The literature indicated that at the most basic level, the knowledge of mathematics is essential in the conduct of everyday living and in commerce, engineering and the natural and social sciences, advanced mathematical concepts and techniques are indispensable tools. Most of the literature reviewed were research studies done in North America, Europe, Australia and several other countries outside Ghana and may not fully fit the context of Ghana or even Africa.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The field of educational research is rather challenging in that the complexity of working with human participants may result in responses which raise more questions, bringing a sense of incompletion to a study (Walker, 2006). Walker points out that the cyclical nature of educational research aims to build systems based on theories and define the value of these systems in practice. This study is a portion of one such system: that of looking at the influence of Senior High School teachers' demographic variables on their self-efficacy in teaching mathematics in the Ashanti region of Ghana.

The aim of the chapter is to describe the procedure adopted in conducting the study. It embraces the research design, population, sample and sampling procedure. It further describes the research instrument used for the study, pilot study, data collection procedure and data analysis plan.

3.1 Research Design

A blueprint for collecting, measuring and analysing data is a research design (Gray, 2009). It was felt that quantitative methods were suitable for establishing relationships between the variables under consideration. As such in this study the researcher employed a cross-sectional survey to investigate the influence of Senior High School mathematics teachers' demographic variables on their self-efficacy in teaching mathematics in the Ashanti Region of Ghana. de Leeuw, Hox, and Dillman

(2007) defined a survey as a research strategy in which quantitative information is systematically collected from a relatively large sample taken from a population.

Creswell (2012) also defined survey research designs as procedures in quantitative research in which investigators administer a questionnaire to a sample or to the entire population of people to describe the attitudes, opinions, behaviours, or characteristics of the population. In this procedure, survey researchers collect quantitative, numbered data using questionnaires (for example, mailed questionnaires) or interviews (for example, one-on-one interviews), and statistically analyse the data to describe trends about responses to research questions and to test hypotheses. They also interpret the meaning of the data by relating results of the statistical test back to past research studies. Creswell (2012) went further to state that the most popular form of survey design used in education is a cross-sectional survey design. In across-sectional survey design, the researcher collects data at one point in time. The cross-sectional survey design was employed in this study. Creswell (2012) again states that whether a survey design is longitudinal or cross-sectional, there are key characteristics of both that will help one design a survey or read and evaluate a published survey study. Survey researchers engage in the processes of:

1. Sampling from a population
2. Collecting data through questionnaires or interviews
3. Designing instruments for data collection
4. Obtaining a high response rate

Frankael and Wallen (2009) posit that the major purpose of surveys is to describe the characteristics of a population. In essence, what researchers want to find out is how the members of a population distribute themselves on one or more

variables (for example, age, ethnicity, religious preference, and attitudes toward school).Again Frankael and Wallen (2009) theorise that survey research is based on the simple idea that if you want to find out what people think about some topic, just ask them.

Normally, the survey research in reference to Weissberg, Krosnick, and Bowen (1989), is a well-liked research method. It permits researcher's to determine the prevalence of attitudes, beliefs and behaviour; to study change in them over time; to scrutinize group differences and to test causal propositions about the sources of attitudes, beliefs, and behaviour. While secondary analysis of existing surveys can for a while substitute for collecting one's own survey data, surveys in any case, can have important advantages over other research methods and are consequently a valuable tool for social scientific investigations.

3.2 Population

In any survey, the first step to collecting data is to define in precise terms the population or community of individuals whose opinions are sought (Babbie, 2007).A population for a study is that group (usually of people) regarding whom we want to draw conclusions (Babbie, 2007). Gay and Airasian (2003) also defined the population as the group of concern to the researcher, the group to which the outcome of the study will be preferably generalized. That is any groups of individuals that have one or more characteristics in common that are of interest to the investigator.

Frankael and Wallen (2009) postulate that as in other types of research, the group of persons (objects, institutions, and so on) that is the focus of the study is

called the target population. The authors go further to state unfortunately; the actual population (called the target population) to which a researcher would really liketo generalize is rarely available. The target population for the study covered all Mathematics teachers in senior high schools in the Ashanti Region of Ghana during the 2013/2014 academic year. The accessible population of the study was all the teachers in the 20 Senior High Schools in six districts of the Ashanti Region.

3.3 Sample and Sampling Procedure

Measuring the entire population is not viable though not entirely impossible. Cohen, Manion, and Morrison (2007) state that there is no clear-cut answer, for the correct sample size depends on the purpose of the study and the nature of the population under scrutiny. A sample of 154 respondents was taken through multistage sampling technique. Frankael and Wallen (2009) state for survey research, a sample with a minimum number of 100 is essential. Again, according to Ary, Jacobs, and Razavieh (2010) the most central characteristic of a sample is its representativeness not its size. The teachers with five or more year-experience was coded as experienced but the teachers with less than five-year experience were coded as novice teachers as in Tschannen, Moran, and Woolfolk-Hoy (2002). According to Creswell (2012), in multistage cluster sampling, the researcher chooses a sample in two or more stages because either the researchers cannot easily identify the population or the population is extremely large. Also multistage sampling is where the researcher divides the population into stages, samples the stages and then resample, repeating the procedure until the final sampling units are selected at the last of the hierarchical levels (Goldstein, 1995 and Thompson, 1992). Multistage sampling according to Ma, Spe,

Al-Harbi, and Efendiev, (2006) is generally used when it is costly or impossible to form a list of all the units in the target population. The Ashanti Region had 30 districts. In the first stage; the researcher selected 6 districts in the region. In the second stage, the researcher 20 schools in the 6 selected districts and in the third stage using convenient sampling technique the researcher selected all teachers from the Mathematics department in the selected school. Convenience samples covered participants who are available and willing to participate in the study (Huck, 2000). The geographical distributions of the schools and teachers across the districts have been summarized in Table 3.1.

Table 3.1: Geographic Distribution of Schools and Teachers across the Districts

District	Number of schools	Number of teachers
Mampong Municipal	4	29
Sekyere Central	3	19
Ejura/Sekyedumase	2	16
Afigya Sekyere South	5	44
Kwabere East	5	39
Ejisu Juaben Municipal	1	7
Total	**20**	**154**

3.4 Research Instrument

Questionnaire was used to collect data from respondents with awareness that the data would be easy to convert into figures for analysis (Gray, 2009). Creswell (2012) posits that a questionnaire is a form used in a survey design that participants in a study complete and return to the researcher.

Several research instruments have been developed for the purpose of identifying levels of teacher self-efficacy. Two instruments, which have been used in other studies and have been statistically validated, were used in this study. This is because according to Frankael and Wallen (2010) a researcher can find and administer a previously existing instrument of some sort. They are the Mathematics Teaching Efficacy Beliefs Instrument/Scale (MTEBI; Enochs, Smith, & Huinker, 2000), and the Fennema-Sherman (1976) Mathematics Attitudes Scales (see Appendix A). The MTEBI contained two sub-scales: Personal Mathematics Teaching Efficacy (PMTE) and Mathematics Teaching Outcome Expectancy (MTOE). Only the personal Mathematics Teaching Efficacy sub-scale was used in this study. Personal Mathematics Teaching Efficacy (PMTE) subscale has been defined as the belief in one's own ability to teach Mathematics effectively (Woolfolk, Rossoff, & Hoy, 1990). Enochs et al. indicated that reliability analysis produced Cronbach's alpha coefficients of 0.88 for PMTE.

The Fennema-Sherman Mathematics Attitudes Scales are 9 separate scales designed to measure some domain-specific attitudes related to the learning of Mathematics. This scale attempts to measure participants beliefs on the importance and relevance of Mathematics in their present and future daily lives. The Mathematics Usefulness Scale has a Cronbach's alpha coefficient of 0.88. Each scale consists of 12

statements related to the learning of Mathematics. Individuals respond to a statement by indicating the degree to which they agree or disagree with that statement. The possible responses are "strongly agree", "agree", "uncertain", "disagree", and "strongly disagree." Each response is given a value from 1 to 5 with 5 indicating a more positive attitude. The Likert scale required respondents to "indicate their agreement or disagreement with a proposition or the importance they attach to a factor, using a standard set of answers" (Ticehurst & Veal, 2000). The benefit of using a Likert scale in this study was that it allowed variation in responses yet generated numerical value (Cohen et al. 2007). All items used a 5-point Likert scale, ranging from 1 = strongly disagree to 5= strongly agree, and responses were coded to indicate high efficacy for high scores.

The questionnaire is divided into three sections: A, B and C, (see Appendix A)

Section A elicits demographic information. It comprised questions related to participants" Name of school, gender, and number of years teaching Mathematics.

Questionnaire Section B is the Mathematics Teaching Efficacy Beliefs Instrument. The items in Section B comprise 12 Likert-type items from the Mathematics Teaching Efficacy Beliefs Instrument. Some of the items on this scale include: I will continually find better ways to teach Senior High School Mathematics, I will be able to teach Senior High School Mathematics as I will teach other subject/s, I know how to teach Senior High School Mathematics concepts effectively etc.

Questionnaire Section C is the Usefulness of Mathematics Scale. The items in this section comprise 12 Likert-type items from the Usefulness of Mathematics Scale. Examples of items in section include the following: Mathematics is needed for future work; Mathematics has contributed greatly to science and other fields of knowledge.

3.5 Pilot Test

The instrument for the study was vetted and then pilot tested to ensure its reliability. For the pilot test, 20 Mathematics teachers, selected from three senior high schools in the Central region were used. The schools used were Mfantsiman Girls Senior High, Boa Amponsem Senior High and Dunkwa Senior High/Technical Schools. The Central Region was used for the pilot test because it was easy for the researcher to have access to some schools in the Region. In many respects, the Central Region has some characteristics that are similar to that of the Ashanti Region. This is in line with Walliman (2008) who recommended that the best method of pilot is to test the questionnaire with persons who have qualified proficiency in the field, to anticipate any issues or sources of confusion. The reliability of the Mathematics Teaching Efficacy Belief Instrument comes was 0.911 and that of the Mathematics Usefulness Scale was 0.782 which tells that instrument is a reliable measure for self-efficacy since according to Pallant (2007), a Cronbach alpha of 0.7 is considered acceptable; whereas values above 0.8 are preferable. The pilot test contributed to the research greatly. This is because after the responses of the respondents in the pilot test, questions deemed difficult to understand were simplified into plain English as much as possible so that any teacher who received the questionnaire would be quick to comprehend the questions and select their answers immediately.

3.6 Procedure for Data Collection

After the pilot test, the questionnaire items were reviewed by the researcher and the supervisor to make sure that some were deleted. Some of the questionnaire items that were deleted included demographic variables such as: I currently hold

certification for the area in which I am teaching, what is your certification subject area, and area of specialization? Before administering the questionnaire, a letter of introduction, was presented to all heads of the selected senior high schools. The purpose of this introductory letter was to seek permission, solicit for cooperation and also to create rapport between the researcher and teachers who served as respondents for the study.

A discussion was held with the heads and in most cases the assistant heads who then introduced me to the heads of the mathematics department of the various schools selected for the study to agree on a convenient time to administer the instrument. Thereafter, the heads of the mathematics department arranged for departmental meeting to enable me explain the purpose of the data collection to the teachers after which the respondents were then guided to complete the instrument. My presence was helpful in that it permits any queries or uncertainties to be addressed instantly with the questionnaire designer (Cohen, Manion, & Morrison, 2007).Some of the teachers decided to complete their questionnaires outside the meeting area and after the explanation.

3.7 Ethical considerations

According to Saunders, Lewis, and Thornhill (2009), ethics refers to the rightness of the researcher's behaviour in relation to the rights of the individuals who become the subjects of the research work, or who could be affected by it. The ethical issues that were considered in the study included: informed consent, voluntary participation, anonymity, confidentiality, and respect (Myers, 2009). Prospective respondents were briefed on the study by reading the introductory paragraph included

in the questionnaire. The introductory paragraph informed prospective respondents about the purpose of the study and stated that their participation was completely voluntary.

Furthermore, respondents were not asked to provide any form of identification, particularly name. As a result, participation was not only voluntary, but also anonymous. Anonymity was again ensured by guaranteeing that no information provided by the respondents could be traced back to them, either during the study or in the reporting.

3.8 Data Analysis

Without the use of statistical techniques raw scores do not have their own meaning and weight. In order to study the nature of data, descriptive statistics i.e. measures of central tendency and dispersion – Mean, Standard Deviation were used. Again, the data were entered into the Statistical Package for the Social Sciences (SPSS) for Windows version 16 for the purpose of analysis of ANOVA, independent-samples t-test, and correlation scores of the items. Descriptive statistics were run on the demographic variables. Again, descriptive statistics were used to analyse data on Research Question 1 to find the number of respondent who strongly agreed, agreed, were uncertain, disagreed as well as strongly disagreed. To analyse data on Research Question 2 independent sample t-test was used. One way analysis of variance (ANOVA) was used to test whether teachers' levels of self-efficacy beliefs vary on the basis of years of experience which was Research Question 3. The Pearson correlation was also calculated between teacher perceived usefulness and efficacy in teaching Mathematics which constituted Research Question 4.

3.9 Chapter Summary

This study examined the influence of Senior High School teachers' demographic variables on their self-efficacy in teaching Mathematics. One hundred and fifty-four (154) teachers from 20 schools in Ashanti region constituted the sample for this study. The instrument for data collection was the Mathematics Teaching Efficacy Instrument/Scale and Mathematics Usefulness Scale were also described. Descriptive statistics, t-test, one-way ANOVA test and Pearson correlation were also used to answer research on questions 1-4. The results of analysis are shown in Chapter 4.

CHAPTER FOUR

RESULTS

4.0 Introduction

The chapter presents the results of the study. The purpose of this study was to investigate the influence of Senior High School Mathematics teachers' demographic variables on their self-efficacy in teaching mathematics in the Ashanti region of Ghana. In this chapter, data were presented and analysed to answer four research questions and three null hypotheses. The results are presented using tables and figures.

4.1 Demographic Variables of Teachers

Table 4:1 presents demographics of the 154 teacher participants that were made up of 141(91.6%) male and 13(8.45%) female teachers. The level of the teachers teaching experiences ranged from less than 5 years to 21 years and more. Table 4.1 further depicts that a reasonable number of the teachers, 57(37.0%), had teaching experience ranging between zero and 5 years and that, of the 154 teachers 05(3.2%) were in the minority group. This is because 3.2% of the teachers had teaching experience ranging from16 years to 20 years, which could be considered as lesser proportion. However, it could be further deduced that of the 154 teachers, 63% of the teachers were in the majority with teaching experience more than 5 years. This implies that majority of the teachers were experienced teachers and hence, their contribution was very important to the study on teacher efficacy to teaching mathematics.

Table 4:1: Demographics of respondents (N= 154)

Demography Variable	Gender		Total	%
	Male	Female		
Teaching Experience				
0-5 Years	50	07	57	37.0
6-10 years	44	04	48	31.2
11-15 years	30	02	32	20.8
16-20 Years	05	00	05	3.2
>21 years	12	00	12	7.8
Total	**141**	**13**	**154**	**100**

Research Question 1: What is the general teaching efficacy level of the mathematics teachers in Ashanti Region?

4.2 Efficacy Level of Mathematics Teachers

Research Question 1 sought to find out the general efficacy level of the mathematics teachers in the study**.** To be able to find out this the Mathematics teachers were given a questionnaire to respond to. From the questionnaire, 12 items were used to find out the efficacy level of the teachers.

Table 4.2: MTEBI scores of senior high mathematics teachers in Ashanti Region(N = 154)

Item	SD		D		UN		A		SA		M	SD
	Count	%	Count	%	Count	%	Count	%	Count	%		
1	4	2.6	0	0	4	2.6	57	37	89	57.8	4.47	0.79
2	23	14.9	24	15.6	18	11.7	54	35.1	35	22.7	3.35	1.38
3	2	1.3	2	1.3	4	2.6	77	50	69	44.8	4.36	0.72
4	4	0	1	0.6	19	12.3	83	53.9	51	33.1	4.19	0.67
5	1	0.6	2	1.3	5	3.2	72	46.8	74	48.1	4.40	.68
6	4	2.6	13	8.4	22	14.3	74	48.1	41	26.6	3.88	.99
7	1	0.6	1	0.6	5	3.2	60	56.6	87	56.5	4.50	.66
8	0	0	2	1.3	6	3.9	69	44.8	77	50.0	4.44	.64
9	13	8.4	18	11.7	23	14.9	65	42.2	35	22.7	3.59	1.20
10	1	0.6	0	0	9	5.8	82	53.2	62	40.3	4.32	.66
11	1	0.6	0	0	9	5.8	82	53.2	62	40.3	4.32	.66
12	0	0	3	1.9	17	11.0	85	55.2	49	31.8	4.17	.69

Note: SD = Strongly Disagree, D = Disagree, NC = Uncertain, A = Agree, SA = Strongly Agree, M=Mean, SD-Standard Deviation, Av = Average

The Senior High School mathematics teachers' scores on the MTEBI scores were analysed by descriptive statistics. As shown in table 4.2 a total of 57.8.% of the mathematics teachers strongly agreed and 37.0% of them also agreed to item 1of the

scale which states that they continually found better ways to teach Mathematics, only 2.6%, were uncertain and the same number strongly disagreed with none of the participants disagreeing. Concerning whether they would be able to teach senior high school Mathematics as they would teach other subject/s 22.7% and 35.1% strongly agreed and agreed respectively while 11.7%, 15.6% and 14.9% were uncertain, disagreed and strongly disagreed respectively.

Half of the participants (50.0%) agreed that they know how to teach Senior High School Mathematics concepts effectively, with 44% of them strongly agreeing to do so, 2.6% were uncertain with 1.3 disagreeing and strongly disagreeing. Concerning effectively monitoring mathematics activities slightly more than half (53.9%) agreed to that whiles 33.1% strongly agreed to the item, 12.3% were uncertain, .6% disagreed and none of the participants strongly disagreed. Regarding whether they have good conception of mathematical concepts to enable them teach Senior High School Mathematics effectively, 48.1% of the participants strongly agreed with 46.8% agreeing with scanty 3.2%, 1.3% and .6% been uncertain, disagreeing and strongly disagreeing in that order. About using manipulatives to explain to students how Senior High School Mathematics works 48.1% agreed to the item, 26.6% strongly agreed with 14.3%, 8.4% and 2.6% in that sequence. As to whether the participants will be able to answer students' questions in Senior High School Mathematics 56.5% of the participants strongly agreed to the item, 56.6% also agreed to the item whiles 3.2%, .6% and another .6% were uncertain, disagreed and strongly disagreed in turn.

Half of the participants (50.0%) strongly agreed that they have the necessary skills to teach Senior High School Mathematics, with 44.8% of the participants also agreeing to the statement, 3.9% of the participants were uncertain, with 1.3% of the

respondents disagreeing and none of the respondents strongly disagreeing. In respect of whether the participants will invite the headmaster to evaluate their Senior High School Mathematics teaching, 42.2% agreed to the item, 22.7% strongly agreed, 14.7% were uncertain, 11.7% disagree, while 8.4% strongly disagreed. As regards whether they will be able to help a student who has difficulty in understanding Senior High School mathematical concept, to be able to understand it better, slightly more than half of the participants (53.2%) agreed to this statement, 40.3% of the participants strongly agreed to the statement, 5.8% of the participants were uncertain, .6% strongly disagreed and none of the participants disagreed to this statement. Regarding their willingness to welcome students' questions when teaching Senior High School mathematics more than half (64.3%) of the participants strongly agreed to the statement, 33.2% of the participants agreed to the statement, .6 of the participants were uncertain and the same number of students disagreed while 1.3% of the participants strongly disagreed. On whether the participants know what to do to turn students on to Senior High School Mathematics, 31.8% of the participants strongly agreed that they know what to do the turn students on to Senior High School Mathematics, 55.2% of the participants also agreed to the item, 11.0 % of the participants were uncertain, 1.9% of the participants disagreed and none of the participants strongly disagreed.

Again, when the self-efficacy scores of secondary school mathematics teachers were analysed, it was observed that their self-efficacy was high with the average of 3.1. The Senior High School mathematics teachers' scores of the MTEBI indicated that they had a high positive sense of efficacy beliefs in teaching Mathematics (M=4.17) from a total of 5

Research Question 2: What is the efficacy level of the male and female Mathematics teachers?

4.3 Efficacy Level of Male and Female Mathematics Teachers

The Research Question 2 sought to find out the male and female teachers' efficacy level in teaching of Mathematics. To be able to find out this the Mathematics teachers were given a questionnaire to respond to. The teachers agreed to most of the efficacy-related statements in the teaching of Mathematics at the Senior High School level used in the study.

To be able to establish the male and female teachers' efficacy, the boxplot in Figure 4.1 is used.

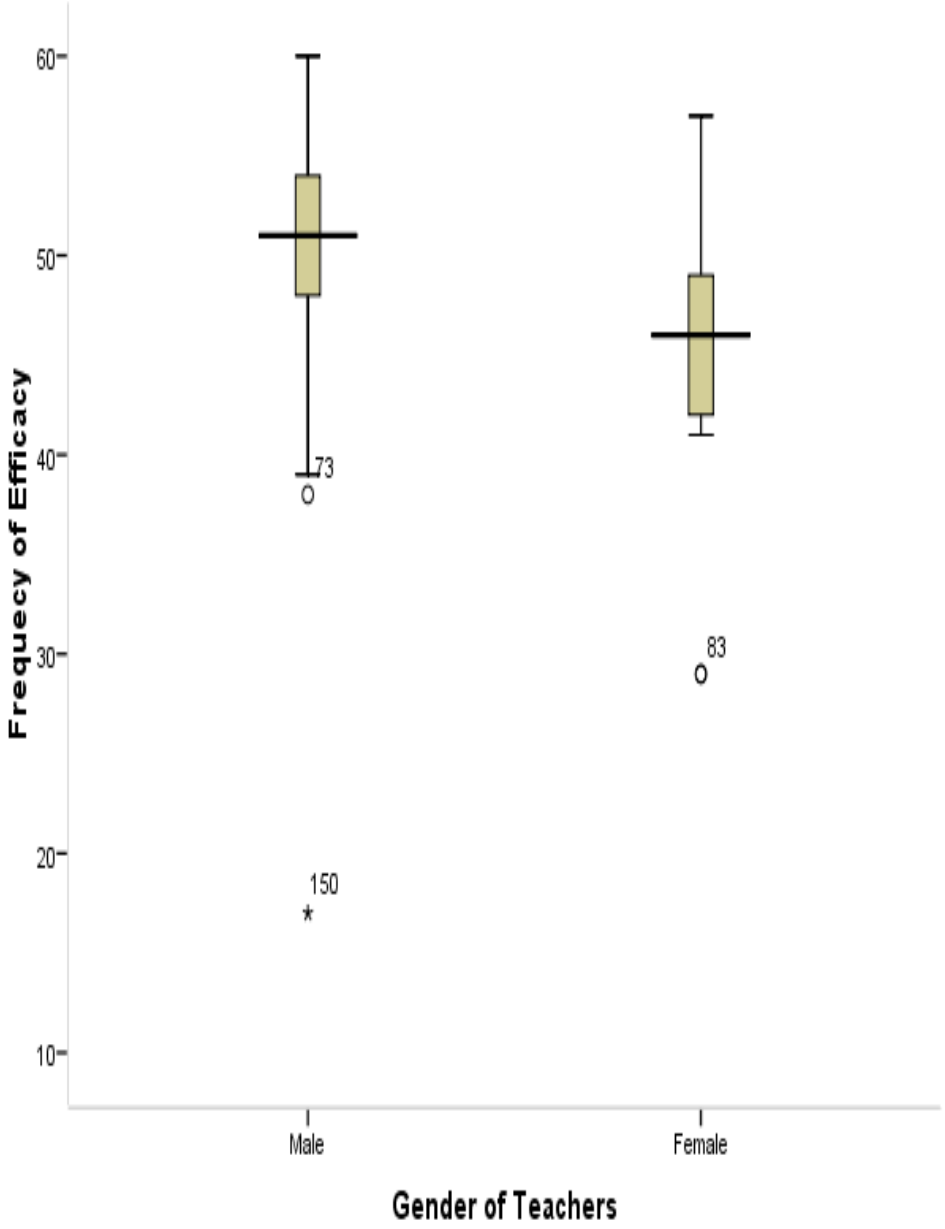

Figure 4.1: A boxplot of male and female mathematics teacher efficacy.

The results from Figure 4.13 show that there is considerable overlap in the efficacy scores of male and female Mathematics teachers. This is because the interquartile range of the male Mathematics teachers was six and the interquartile range of the female Mathematics teachers' efficacy was eight. The findings show that the middle 50.0% of the female Mathematics teachers' efficacy score is higher than

that of the male Mathematics teachers' efficacy. This could be due to the difference in the percentage of the male and female Mathematics teachers involved in the study. However, the mean score of the female Mathematics teachers' efficacy (M = 40.77, SD = 8.3) is lower to that of the mean score of the male Mathematics teachers' efficacy. (M = 50.77, SD = 5.6).

To be able to establish the difference in Mathematics teachers' efficacy among the male and female teachers, the independent-samples t-test was calculated. The results from the independent-samples t-test was used to test whether there was any statistical significance difference between the mean scores of the male Mathematics teachers' efficacy and their female counterparts. The results on the independent-samples t-test are presented in Table 4.3.

From Table 4.3, the independent sample t-test revealed statistical significant difference between the mean efficacy score of male Mathematics teachers and the mean efficacy score of female Mathematics teachers $t(152)=3.5$, $p=0.001$. As predicted the male Mathematics teachers (M=50.77, SD=5.6, N=141) was higher than their female counterparts (M=40.77, SD=8.3, N=13 in the teaching of Mathematics.

Table 4.3: Independent-Samples t-test Results on Male and Female Teachers' Mathematics Efficacy

Gender	N	Mean	SD	t	df	P
Male	141	50.77	5.6	3.5	152	0.000*
Female	13	40.77	8.3			

* Significant, $p < 0.05$

Research Question 3: What is the relationship between Mathematics teachers' levels of self-efficacy beliefs and their years of experience?

4.4 Experience and Mathematics Teacher Efficacy

The Research Question 3 sought to establish the effects of Mathematics teachers' teaching experience on teacher efficacy. In the study teaching experience is considered as the number of years the teachers involved in the study have been teaching Mathematics at the Senior High School level. To be able to establish this some aspects of the questionnaire (Item 3) was used against the teacher efficacy items. The result of mathematics teachers' teaching experience is first presented in Table 4.4.

The results from Table 4.4 show that out of the 154 Mathematics teachers, 37.0% of them were within the teaching experience bracket of 5 years and below. This is because 63.0% of the teachers have been teaching high school Mathematics for a time period more than 5 years. Out of the 63.0% teachers with more than 5 years

Mathematics teaching experience, 31.2% have 6-10 years of teaching experience, 20.8% have between 11-15 years teaching experience, 3.2% have teaching experience bracket between 16-20 years, and 7.8% were above 21 years of teaching experience. This indicates that most of the Mathematics teachers in this study were experienced teachers. This is because the teachers had had more than 5 years of teaching high school Mathematics.

Table 4.4: Mathematics Teaching Experience in Years (N = 154)

Years of teaching Mathematics	N	%
0-5 years	57	37.0
6-10 years	48	31.2
11-15 years	32	20.8
16-20 Years	5	3.2
>21 years	12	7.8
Total	**154**	**100**

The main focus of Research Question 3 was to establish the effect of teacher teaching experience on Mathematics teacher efficacy. This could not be provided by the results and findings from Table 4.4. To establish the effects of the teacher teaching experience, on teaching Mathematics, the boxplot in Figures 4.14 was explored.

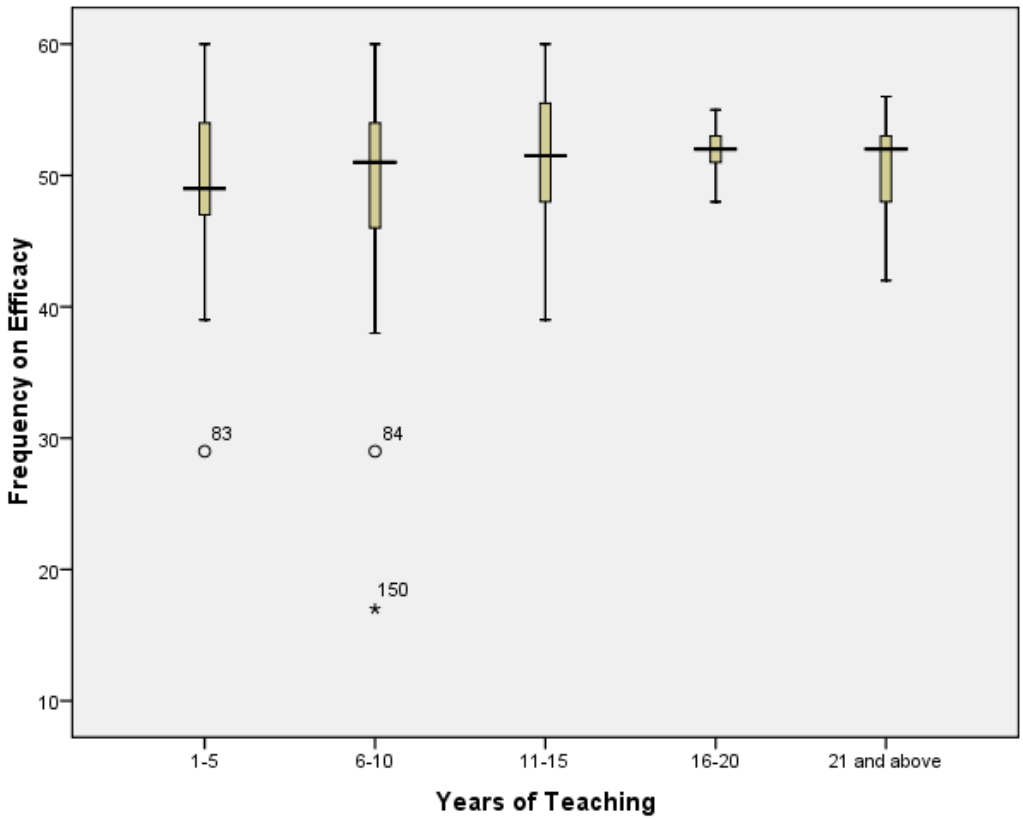

Figure 4.2: A boxplot exploring effects of teaching experience on mathematics teacher efficacy

From Figure 4.2, the results show that there are considerable overlaps in the effects of teacher teaching experience on Mathematics teacher efficacy. This is partly because the interquartile ranges of teacher teaching experience from 1-5 years, 6-10 years, 11-15 years, 16-20 years and 21 years and above were respectively, 7.0, 8.0, 8.0, 4.0, and 6.0. This shows that the middle 50.0% of the teachers with 6-10 years and 11-15 years teaching experience has efficacy scores higher to that of teachers with 1-5 years, 21 years and above, and 16-20 years teaching experiences. The overlaps could be attributed to the number of teachers within each group of teacher teaching experience in Mathematics.

The mean efficacy scores of the five groups of teacher teaching experience further show that the individual teaching experience has effect on Mathematics teacher efficacy. This is because the mean efficacy score of 1-5 years teaching experience (M = 50.0, SD = 5.6) is different from the mean efficacy scores of 6-10 years (M = 49.7, SD = 7.7), 11-15 years (M = 51.3, SD = 4.9), 16-20 years (M = 51.8, SD = 2.6), and 21 years and above (M = 50.6, SD = 4.1). To be able to establish how significantly the mean efficacy scores for the groups of teacher teaching experience differ from one another, a one-way ANOVA test analysis was done. After the calculation of the one-way ANOVA test, the Levene's test from the Test of Homogeneity of Variance was calculated as 0.179 (p = 0.18). The significance value for the Levene's test is greater than 0.05, and hence the assumption of equal variances was not violated in this case. It is therefore proper to consider the actual results from the one-way ANOVA to establish whether there is significant difference between the five groups of teacher teaching experience on teacher efficacy in Mathematics. The results from the one-way ANOVA are presented in Table 4.5.

From Table 4.5, the results with respect to teacher teaching experience show that there was no statistical significant difference between the means of the five groups of teacher teaching experience on Mathematics efficacy. This is because the mean efficacy score of teachers with 1-5 years teaching experience (M = 50.0, SD = 5.6, F = 0.5, df = 149, p = 0.725) is not different statistically from the mean efficacy scores of teachers with 6-10 years teaching experience (M = 49.7, SD = 7.7), teachers with 11-15 years teaching experience (51.4, SD = 4.9), teachers with 16-20 years teaching experience (M = 51.8, SD = 2.6), and teachers with 21 years and above teaching experience (M = 50.6, SD = 4.1).

Table 4.5: One-way ANOVA Test Results on Teacher Teaching Experience and Efficacy (N = 154)

Experience/years	n	M	SD	F	df	p
1-5	57	50.0	5.6	0.5	149	0.725*
6-10	48	49.7	7.7			
11-15	32	51.4	4.9			
16-20	5	51.8	2.6			
21 and above	12	50.6	4.1			

* Significance, $p > 0.05$

Research Question 4: What is the relationship between Mathematics teachers' perceived usefulness of Mathematics and their efficacy towards the teaching Mathematics?

4.5 Relationship between Perceived Usefulness of Mathematics and Teachers' Efficacy towards the teaching of Mathematics

The Research Question 4 sought to find out whether there is a relationship between Mathematics teachers perceived usefulness of mathematics and their efficacy in teaching Mathematics at the SHS level. The appropriate statistical test analysis to establish the relationship is Pearson. This is because Likert item on its own is most likely ordinal, but a composite score from a measurement scale made up of the sum of

a set of interrelated items can take on properties that appear much more continuous than categorical, especially as response options, items, and sample size increase (Carifio & Perla, 2007). Again, Likert scales which combine the summated effects of multiple Likert-type items has become widely accepted as resulting in quantitative interval scale scores (Allen &Seaman 2007, Boone & Boone 2012, Carifio & Perla 2007). As a result of this the two variables (perceived usefulness of mathematics and teacher efficacy) were measured on scale as continuous variables. However, before the Pearson correlation was calculated between teacher perceived usefulness of mathematics and their efficacy in teaching Mathematics, a scatter-plot was used to ascertain the need to calculate the Pearson correlation. The results from the scatter-plot are presented in Figure 4.3.

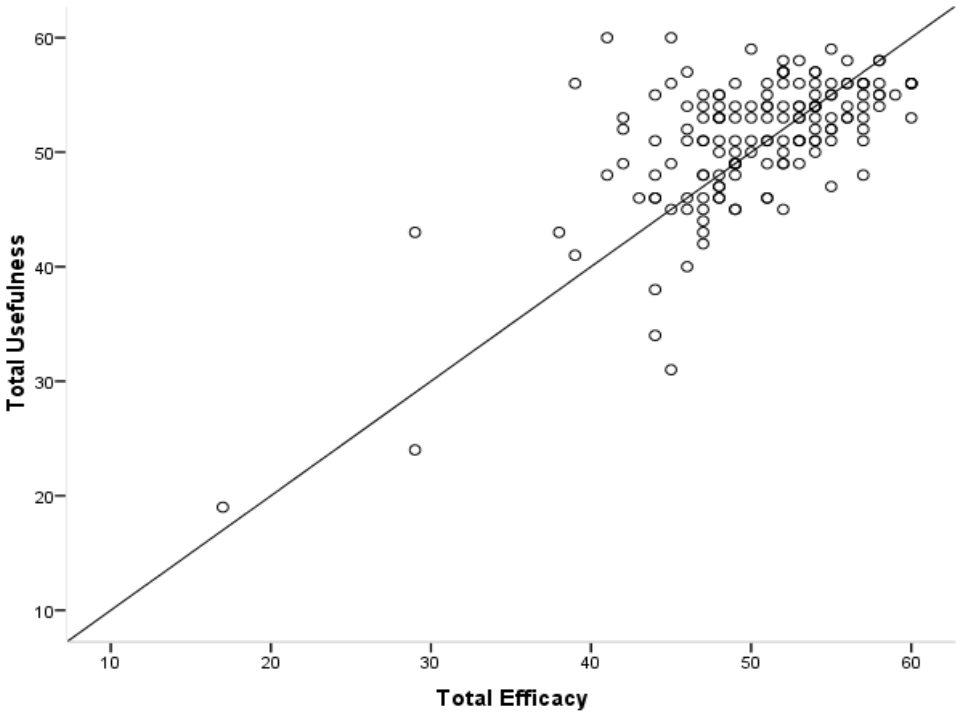

Figure 4.3: Scatter-plot of correlation between mathematics teachers' perceived usefulness of mathematics and efficacy in teaching mathematics.

From Figure 4.3, the results show that the relationship is sufficiently linear to continue with the Pearson correlation to establish whether there is relationship between teacher perceived usefulness of mathematics and teacher efficacy.

From Pearson correlation test analysis as shown in Table 4.6, it was established that there is a fairly strong and positive correlation between teacher perceived usefulness of mathematics and teacher efficacy in teaching Mathematics ($r = 0.644$, $p < 0.01$). This gives an indication that teacher perceived usefulness and teacher efficacy share 41.5% of their variation in common.

Table 4.6: Correlation between usefulness of mathematics and teacher efficacy in teaching mathematics

Correlations

		Total Efficacy	Total Usefulness
Total Efficacy	Pearson Correlation	1	.644**
	Sig. (2-tailed)		.000
	N	154	154
Total Usefulness	Pearson Correlation	.644**	1
	Sig. (2-tailed)	.000	
	N	154	154

**. Correlation is significant at the 0.01 level (2-tailed).

4.5 Chapter Summary

In this chapter the researcher reported the results of the teachers' responses to the questionnaire items. The statistical analysis reported in this study was based on four research questions and three hypotheses presented in Chapter one. The first

research questions was analysed using descriptive, the second research was analysed using independent sample t-test, one way ANOVA and Pearson correlation were used on the rest.

CHAPTER FIVE

DISCUSSION

5.0 Introduction

The following is a discussion of the results of the Mathematics Teaching Efficacy Belief Instrument, and the responses of the Mathematics teachers to those questions posed in the survey.

Research Question 1: What is the general teaching efficacy level of the mathematics teachers in Ashanti Region?

The Senior High School mathematics teachers' scores of the MTEBI indicated that they had a high positive sense of efficacy beliefs in teaching Mathematics (M=4.17) from a possible score of 5. This agrees with Senemoglu et al. (2009) study where teachers' average of self-efficacy belief scores was found to be at a 'good level'. The fact that the teachers self-efficacy belief was found to be high showed that they held a strong belief that they had knowledge and skills of effective teaching behaviours. This however disagrees with Aktaşet al. (2013) where the level teachers' education process self-efficacy perception as found as medium. This could imply that the teachers had self-belief that they do not have any shortfall which could be revealed whenever their lessons are evaluated by another individual. It could further imply that the teachers believed that they had acquired the needed knowledge, skills, and attitudes to effectively handle the teaching and learning environment (Sridhar & Razavi, 2008) for students to develop mathematical concepts. The reason for this could be that these days teachers love their work probably due to the ban on recruitment of new employees and for that matter in order to secure their jobs teachers

have to do more in terms of preparation for teaching which goes a long way to boost their confidence and also the self-efficacy belief in teaching mathematics. It could also be that the ranking system by the Statistics, Research, Information, Management and Public Relations (SRIMPR) Division of the Ministry of Education (MoE) which makes teachers devote time teaching in order to ensure that the schools they teach are well placed in these rankings.

Research Question 2: What is the efficacy level of the male and female Mathematics teachers?

The findings show that the male Mathematics teachers' efficacy in teaching mathematical concepts at the senior high school level is comparative higher to that of their female counterparts. This means that the male Mathematics teachers have the self-belief that they have the knowledge, skills, and attitudes needed in teaching Mathematics-related concepts at the high school level. This finding agrees to the study by Ghasemboland and Hashim (2013) where male teachers considered themselves more efficacious than female teachers in all dimensions of teaching efficacy.

However, the findings of the current study are not in agreement with the findings from the study of Isler and Cakiroglu (2009) where there was no difference in teacher efficacy in teaching Mathematics at the basic school. The current study may have shown a difference between the efficacy of male and female Mathematics teachers at the high school level as the knowledge, skills, and attitudes required to teach Ghanaian high school Mathematics could be demanding than that required at the basic school level. Again the study is not in agreement with Ghonsooly, Khajavy, and Mahjoobi (2014) whose result showed that gender does not affect teacher trainees'

self-efficacy and meta-cognition. The difference in the findings of the current study and the study of Isler and Cakiroglu (2009) could be that in Ghana all high school Mathematics teachers are Bachelor degree holders and most instances with Bachelor's degree in Education whereas most teachers teaching Mathematics at the basic school level are diploma in education holders. The reason for this result could be that it is a general perception that boys are better at mathematics than girls. Again, others believe that male students suffered less anxiety dealing with mathematics tasks than female students and they are also more confident and motivated in learning mathematics. As a result of these male teachers who are more comfortable with mathematics are more likely to devote more time to teaching it, and are more likely to teach it with creativity than the female teachers who have some more anxiety in mathematics.

Research Question 3: What is the relationship between Mathematics teachers' levels of self-efficacy beliefs and their years of experience?

The findings show that Mathematics teacher efficacy is not dependent upon the teacher's teaching experience. This finding contradict studies such as Siaw-Marfo (2011), which tested for difference between novice and experienced Social Studies teachers teaching efficacy; Akbari and Moradkhan (2010), which tested for difference between teaching experiences on English as a Foreign Language teacher efficacy; and Tschannen-Moran and Woolfolk-Hoy (2001), which tested for difference between teaching experiences on teacher efficacy. In all the cases, there was a significant difference in teaching experience on teacher efficacy. The current study may have not shown any difference in teaching experience on teacher efficacy because the area is Mathematics which is different from Social Studies or English as a Foreign Language.

However, in the work of Kim et al. (2014), there was a difference between teaching experiences on Mathematics teacher efficacy at the Elementary School level. Here too, the difference could have occurred because the study was conducted at the Elementary School level but in the current study, there is no difference between teaching experiences categorised as that of Kim et al. (2014) on Mathematics teacher efficacy at high school level. The implication here is that there is an equal self-belief of less-experienced, experienced, and most-experienced Mathematics teachers in teaching mathematical concepts to high school students. And this further reflects the agreement of the teachers on most statements with respect to efficacy as reported in Table 4.2. The reason for this could be that these days most headmasters do not use out of field teachers to teach mathematics but rely on teachers who have done courses in mathematics and more especially mathematics education. As a result of this even if their level of experience is low they still have the subject matter knowledge and also the pedagogical skill knowledge which goes a long way to make them have the belief that they can teach mathematics just like those who have more experience.

Research Question 4: What is the relationship between Mathematics teachers' perceived usefulness of Mathematics and their efficacy towards the teaching of Mathematics?

The correlation coefficient suggests a fairly strong relationship between teachers' perceived usefulness and teacher efficacy in teaching Mathematics. This supports the view of Adams, Nelson, and Todd (1992) on the fact that behaviour is strongly affected by perceived usefulness. It again agrees with the report of Venkatesh (2002) that a substantial body of prior research has revealed that perceived usefulness has appositive effect on behavioural intention to act. The reason for this is that as teachers know that Mathematics is very important in everyday activities, it also

gingers them to be more confident and have the strong sense of belief that they can affect students' learning.

5.1 Chapter Summary

The study has shown that the Mathematics teachers efficacy was high, which means that they have the self-belief that they can bring about desired behaviour in the learners. This finding support the study of Gökmen, Ekici, Çimen, and Altunsoy (2011) who stated that self-efficacy perceptions regarding teaching process were found as high in their study. However, a study by Üstüner, Demirtaş, and Cömert, (2009) indicate that teachers' sense of efficacy was moderate.

The male Mathematics teachers in this study had a higher self-efficacy belief than their female counterparts in the teaching of Mathematics. This finding supports Hackett and Betz (1981), that women's socialisation provides them with less exposure to the information that allows individuals to develop self-efficacy for traditionally male-like occupation. For example at home, parents often portray Science and Mathematics as male domains (Meece & Courtney, 1992).

The findings showed that there was no significant difference between Mathematics teachers teaching efficacy and teaching experience. This contradicts the findings of Greenwald, Hedges, and Laine (1996) that teaching experience had a positive and significant effect on student achievement.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter gives a concise account of how the study was carried. It presents a summary of the study. After the summary, recommendations are made to raise the self-efficacy of teachers in Ghana in the teaching of Mathematics.

6.1 Summary of Research Process

Teacher efficacy is an important issue in the field of education, particularly when a society wants to raise its quality of education and the future of its citizens in the long run. The purpose of examining the teacher efficacy of the Mathematics school teachers of Ghana is to ensure that the subject by its core nature is handled carefully and effectively. This is to achieve the overarching goal of making the individual learner a responsible citizen in a democratic society.

Early works recommend that a teacher's beliefs in his or her ability to positively impact student learning are critical to the actual success or failure in a teacher's behaviour. These beliefs, called teacher self-efficacy, are explained in Bandura's (1977) social cognitive theory.

The study aimed at investigating the influence of Senior High School teachers' demographic variables on their self-efficacy in teaching mathematics in the Ashanti Region of Ghana. The following research questions were used to guide this study

1. What is the general teaching efficacy level of the mathematics teachers in Ashanti Region?
2. What is the efficacy level of the male and female Mathematics teachers?
3. What is the relationship between Mathematics teachers' levels of self-efficacy beliefs and their years of teaching experience?
4. What is the relationship between Mathematics teachers' perceived usefulness of Mathematics and their efficacy towards the teaching of Mathematics?

Again, the following hypotheses were formulated to answer research question 2, 3 and 4.

1. The self-efficacy of male Mathematics teachers will be higher than their female counterparts in the teaching of Mathematics.
2. The level of teacher self-efficacy for experienced Mathematics teachers will be higher than the less experienced Mathematics teachers in the teaching of Mathematics.
3. Mathematics teachers who perceive Mathematics to be useful are likely to be more efficacious than those Mathematics teachers who do not perceive such usefulness towards the teaching of Mathematics in Senior High Schools.

The research design for the study was a cross-sectional survey. The sample comprised 154 Mathematics teachers. The 154 teachers were selected through multistage sampling procedure. Data was collected by use of questionnaire. The questionnaire consisted of 27 items. The 27-item questionnaire was pilot-test to ascertain its reliability. The main statistical tools used were percentages, means, standard deviations, independent-samples t-tests, one-way ANOVA and Pearson correlation.

6.2 Summary of Key Findings

1. The results revealed that the mathematics teachers' had a high positive sense of efficacy beliefs in teaching Mathematics
2. The male Mathematics teachers' efficacy in teaching the concepts under Mathematics at the senior high school level was comparatively higher to that of their female counterparts.
3. Teacher efficacy in teaching Mathematics was not dependent upon teaching experience. That is there is no statistically significant difference between teaching experiences on Mathematics teacher Efficacy.
4. Teacher perceived usefulness is correlated with teacher efficacy in teaching Mathematics. This is because there was a strong positive relationship between teacher perceived usefulness and teacher efficacy in teaching Mathematics.

6.3 Conclusions

The study has shown that high school Mathematics teachers have high self-belief in the teaching of mathematical concepts. The male mathematics teachers show high level of efficacy in teaching mathematics as compared to female Mathematics teachers. In terms of relationship between male and females Mathematics teachers' efficacy in teaching, male Mathematics teachers have higher self believe than their female counterparts. The implication of this is that Mathematics teachers' efficacy was dependent on teachers' gender.

The findings did not support the works of Akbari and Moradkhani (2008); Karimvand (2011) where experienced teachers were more efficacious than novice

teachers. This is because in the study there was no difference between groups of teacher teaching experiences on Mathematics teacher efficacy. The current study has added to the literature that teacher efficacy in relation to teaching experience is not static; there could be difference between novice and experienced teachers on teacher efficacy and there could be no difference between novice and experienced teachers teaching efficacy. The senior high school teachers are having higher efficacy beliefs in teaching mathematics owing to various conferences, workshops and in-service training that, Mathematical Association of Ghana, Ghana Education Service (GES), Ghana National Association of Teachers (GNAT), National Association of Graduate Teachers (NAGRAT), and Non-Governmental Associations (NGOs) frequently organise for its members which have helped in inculcating confidence among them.

6.4 Recommendations

The results from this research have several implications and recommendations. It is envisioned that the following recommendations based on the findings of this study would help improve the self-efficacy of teachers in teaching Mathematics in senior high school.

1. Though Mathematics teachers' self-efficacy was high, additional training through workshops and seminars should be organised for teachers who experience low self-efficacy in specific content areas by the Ghana Education Service.
2. All mathematics teachers in general and female Mathematics teachers in particular, should undergo constant professional development programme as it is the most important factor influencing their efficacy belief in teaching

mathematics. It is therefore recommended that special training be organised by Ghana Education Service together with headmasters of various Senior High Schools to give the teachers the needed professional development.

3. As the findings of the study indicated that various factors influence teacher self-efficacy positively, it is therefore recommended that Teacher Education Institutions in Ghana should review their curriculum periodically to ensure that they are at par with the changes in the high school educational system and the curriculum.

6.6 Suggestions for Further Research

In this section, recommendations for further research are put forward.

1. The study surveyed the views of teachers on teachers' self-efficacy in teaching mathematics using the Mathematics Teacher's Efficacy Belief Instrument, which was a questionnaire. It is therefore recommended that further research should involve a test in content knowledge, so that teachers can be assessed to confirm their confidence in content knowledge, rather than allowing them to rate themselves without the actual test.
2. The study only investigated Mathematics teacher self-efficacy but not that of the students. It is therefore recommended that a further study should be conducted to examine the link between student achievement goal and teacher self-efficacy

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APPENDIX A

QUESTIONNAIRE

Dear Mathematics teacher, this questionnaire is designed to collect information about how well you believe in your ability to implement Senior High School Mathematics curriculum. Please answer the following questions as frankly as possible to enable you contribute immensely towards effective teaching and learning of the subject. Please do not write your name on any part of the questionnaire. Your answers will be kept strictly confidential and will not be identified by name and there are no right or wrong answers. Your participation in this research is voluntary. Please complete each section as described below. Thank you.

Demographic Information Questionnaire

1. Name of school: _____
2. Gender: Male [ ] Female [ ]
3. Number of years teaching 1-5 [ ] 6-10 [ ] 11-15 [ ] 16-20 [ ] 25+ years [ ]

The following are the values assigned to each selected agree or disagree statement:

1	2	3	4	5
Strongly Disagree	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**

Please indicate the degree to which you agree or disagree with each statement below by ticking the appropriate number to the right of each statement as **[√].**

Mathematics Teaching Efficacy Beliefs Instrument

1. I will continually find better ways to teach Senior High School Mathematics.	1	2	3	4	5
2. I will be able to teach senior high school Mathematics as I will teach other subject/s	1	2	3	4	5
3. I know how to teach Senior High School Mathematics concepts effectively.	1	2	3	4	5
4. I will be very effective in monitoring Senior High School Mathematics activities.	1	2	3	4	5
5. I have good conception of mathematical concepts to enable me teach Senior High School Mathematics effectively.	1	2	3	4	5
6. I will use manipulatives to explain to students how Senior High School Mathematics works.	1	2	3	4	5
7. I will be able to answer students' questions in Senior High School Mathematics.	1	2	3	4	5
8. I have the necessary skills to teach Senior High School Mathematics.	1	2	3	4	5
9. I will invite the headmaster to evaluate my Senior High School Mathematics teaching.	1	2	3	4	5
10. When a student has difficulty in understanding a Senior High School mathematical concept, I will be able to help the students understand it better.	1	2	3	4	5
11. When teaching Senior High School Mathematics, I will welcome student questions.	1	2	3	4	5

12. I know what to do to turn students on to Senior High School Mathematics.	1	2	3	4	5

Usefulness of Mathematics Scale

13. Mathematics is needed for future work.	1	2	3	4	5
14. Mathematics has contributed greatly to science and other fields of knowledge.	1	2	3	4	5
15. Knowing Mathematics will help one to earn a living.	1	2	3	4	5
16. Mathematics is a worthwhile and necessary subject.	1	2	3	4	5
17. Mathematics is less important to people than art or literature.	1	2	3	4	5
18. It is important for artists and writers to understand Mathematics as well as scientists.	1	2	3	4	5
19. Mathematics has contributed greatly to science and other fields of knowledge	1	2	3	4	5
20. Mathematics is important for the advancement of civilization and society.	1	2	3	4	5
21. Mathematics is important in everyday life.	1	2	3	4	5
22. Mathematics helps develop a person's mind and teaches him to think.	1	2	3	4	5
23. Mathematics is needed in designing practically everything.	1	2	3	4	5
24. Mathematics is needed in order to keep the world running.	1	2	3	4	5