# SENIOR HIGH SCHOOL TEACHERS' SELF-EFFICACY BELIEFS IN TEACHING MATHEMATICS

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**Abstract**

*The study sought to find out the Senior High School teachers' Self-Efficacy Beliefs for Teaching Mathematics. The research design adopted for this study was a mixed method. The survey research method used a questionnaire to collect data, a semi-structured interview guide was also used in the collection of first-hand information. The researcher used the simple random sampling technique to select thirty (30) Mathematics teachers and 30 students in senior high schools in the Central Tongu District of the Volta Region. The questionnaires were administered to mathematics teachers and interviews were conducted for the students to ascertain first-hand information. Descriptive statistics were used to analyse the questionnaires and the interview data was analyzed thematically. Findings showed that the overall mean of (4.57, SD=0.57) which means teachers' self-efficacy beliefs for teaching SHS Mathematics is high. The interview with the students also confesses the level of Senior High School Teachers' Self-Efficacy Beliefs for Teaching Mathematics to be high as well. Therefore, it was concluded that even though the teachers' self-efficacy beliefs for teaching SHS mathematics were high it does not contribute to the performance of the schools in the final examinations. It was therefore recommended among others that a probe should be launched into why the Teachers' Self-Efficacy Beliefs for Teaching Mathematics could not contribute to better performance of students in Mathematics.*

**Keywords:** Self-Efficacy, Self-efficacy Beliefs for Mathematics Pedagogy, Self-efficacy for Teaching Mathematics Content, Mathematical Knowledge for Teaching.

## Introduction

Mathematics cuts across the fundamental human activities hence, without it man cannot have basic survival skills. According to Sherrod, Dwyer, and Narayaro (2009), the nations in the world which made mathematics and science their culture are leading in terms of development and growth, while other nations that have neglected the culture of mathematics and science find themselves lagging and have their survival, development, and growth threatened. Soyami (1997) described mathematics as a body of knowledge that opens the individual's mind to think critically and analytically, reason logically, and think creatively with deep focus and clarity of thought, and precision. In this vein, mathematics is regarded as the bedrock of every economy. Because of its importance, it is made compulsory for all senior high school students. The importance of mathematics has compelled governments to ensure the provision of high-quality mathematics education in all schools at all levels in nations outside Ghana (NCCA, 2014).

Despite the above importance of mathematics, the performance of students in mathematics has been poor over the years. Several studies show that the problem of poor performance in mathematics is a worldwide canker that has been around for decades and little has been done to change its occurrence (Tariq, 2002; Rylands & Coady, 2009; Matthews et al., 2013; Groen et al., 2015). Research conducted by Eshun (1990, 1999) revealed that the general performance of senior secondary school students in

mathematics in Ghana has been low consistently. The poor performance of Ghanaian students was reflected in how they performed poorly in the Trends in International Mathematics and Science Study (TIMSS) survey (2003). Ghana placed 45th position in the world (Anamuah-Mensah, Mereku & Asabere Ameyaw, 2004). In 2007, among all African countries that took part in the TIMSS examination, Ghanaian students' performance worsened more than that of 2003 TIMSS results and Ghanaian students' performance was among the lowest in Africa (Anamuah-Mensah, Mereku & Ghartey-Ampiah, 2008). The National Education Assessment (NEA) result also showed that the majority of primary schools' performance in mathematics was very poor in Ghana (Adu, Acquaye). All the studies cited point to the fact that poor performance in mathematics is an age-long problem in Ghana.

Since teachers are controllers of the kind of mathematical knowledge learners acquire, many researchers have researched mathematics teachers' total preparedness to help students perform better in mathematics. According to Powell-Moman and Brown-Schild (2012), teachers' sense of self-efficacy could influence their teaching skills which could determine the kind of perception the students could have about their teachers' Pedagogical Content Knowledge (PCK). This will help define the students' ideology about mathematics which could serve as a motivating factor for their achievement in mathematics. Southwell and Penglse (2005) emphasize the need for a teacher to be proactive and also have good pedagogical content knowledge. Asiedu–Addo, and Yidana (2000) found that mathematics teachers' mathematical content knowledge could be one factor contributing to the low performance of learners in mathematics at the pre-tertiary level of the educational system. The two Senior High Schools in the Central Tongu District also have their fair share of poor performance in mathematics over decades. For instance, in the Senior High School "A" from the past 5-year from 2014 to 2018 out of 2759 students who took part in the WASSCE only 372 students representing 13.5% students got A1-C6 and qualified for a tertiary institution. Similarly in Senior High Technical Schools "B" in the past 5 years from 2014 to 2018, out of 1927 students who took part in the WASSCE, only 49 students representing 2.5% of students got A1- C6 and qualified for tertiary institutions. When the new headmaster of SHS "A" informed parents at a PTA meeting on the 20th of October, 2018 that only 9% of the 503 students registered for WASSCE 2017/2018 academic year had A1- C6 in mathematics and therefore were those who qualified for tertiary institutions, the parents were cut to the heart and worried about the academic success of their children and wondered what could be done to help them. This development kept the staff wondering about what might be responsible for this occurrence over the years. At a mathematics departmental meeting that the headmaster organized for mathematics teachers, they strongly believed that they had the skills and the knowledge (self-efficacy beliefs) to deliver for the success of students. If this is the case, why are the students not doing well in mathematics? These call for scientific investigation and hence the choice of the problem.

Studies have shown that teachers' efficacy is a very important element in teachers' effectiveness in pedagogical content knowledge that is related consistently to teacher behaviours during and after lessons and students' outcomes (Bray-Clark & Bates 2003). Some people have the assumption that teachers who have low self-efficacy cannot be effective in pedagogical content knowledge thereby creating a negative perception in the mind of students and this was supported by Podell, and Soodak (1993). The authors disclosed that teachers with high self-efficacy are more effective in pedagogical content knowledge and produce better student outcomes because they can use effectively their pedagogical content knowledge in helping students who have problems overcome their challenges. Bray-Clark, and Bates (2003), also revealed that teachers who have a high level of self-efficacy will also have pedagogical content knowledge regarding teaching and produce students with higher achievement across a range of academic disciplines. Barnes (1998) discovered that there is a positive correlation between self-efficacy and teacher effectiveness. Teachers with high self-efficacy will spend

more time supporting student learning and support students in the achievement of their goals and help build intrinsic motivation toward learning. According to Yeh (2006), teacher self-efficacy is a reliable predictor of the improvement of the personality characteristics of teachers which will go a long way to influence students' achievement.
Kennedy (2001) was of the view that teachers' self-efficacy is the centre of achieving better classroom teaching and learning. Again, a study by Darling-Hammond (2010) and Feiman-Nemser (2012) revealed that teachers have problems with the application of the training they acquire in college to real classroom situations. This makes learners have negative perceptions of their teachers' pedagogical content knowledge. This affects the learners' performance.

Teachers' Self-efficacy belief in teaching mathematics is also a crucial concern for the players in the mathematics fraternity. Self-Efficacy according to Bandura (1993) is a belief about one's self of having the ability to successfully perform a task. Bandura continues to add that people's self-efficacy beliefs can determine the way they think, the way they motivate themselves, the way they feel, and the way they behave. According to Tschannen-Moran and Woolfolk Hoy (2001), teachers' self-efficacy is an assurance of their capabilities to achieve the desired results for motivated students and those that are not motivated. In this regard, for students to perform better in mathematics, teachers' self-efficacy for teaching also plays a major role since the teachers are the vehicle that carries the knowledge and also controls the learning atmosphere. Therefore, teachers with a high level of efficacy could help create a mathematics environment that allows critical thinking and creativity in the learners other than teachers focusing on the student's performance (NCTM, 2000; Stipek, Givvin, Salmon & MacGyvers, 2001). Having high self-efficacy could reduce mathematics anxiety, as well as impact positively on classroom environments and practices while having low mathematics self-efficacy will lead to less confidence which can hinder their actual teaching performance (Beswick, 2006; Cakiroglue, 2008; Powell-Moman & Brown-Schild, 2011). Research shows that professional development can motivate teachers, improve their self-efficacy, and assists them in the successful implementation of the curriculum to help learners learn effectively (Bennett, 2007).

## Problem Statement

The poor performance of senior high school students in Mathematics in Central Tongu District has been a worry for many mathematics educators, parents, students, and other stakeholders in the district for decades. Ghanizadeh and Moafian (2014) discovered that teachers' self-efficacy beliefs about themselves and their capabilities are very crucial and can be influential in the quality of the teacher's performance in the classroom. Research also shows that teachers' level of self-efficacy beliefs determines the teachers' PCK which also leads to the perception that students may carry their teachers' PCK which may affect their learning outcomes (Powell-Moman & Brown-Schild, 2011). Poor performance is also attributed to a low level of teachers' self-efficacy beliefs and the pedagogical content knowledge in mathematics as well as the students' perceptions that they carry about their teachers' PCK (Asante & Mereku, 2012, Asiedu-Addo & Yidana, 2000). Research also shows that low mathematical knowledge in both content and pedagogical knowledge of teachers' can influence their teachers' perceived self-efficacy beliefs which limit their mathematical ability and increase anxiety, as well as their impact on classroom practices (Davis & Ampiah 2008; Asiedu-Addo & Yidana, 2000). According to Holden, Groulx, Bloom, and Weinburgh (2011), the teachers' self–efficacy beliefs had consistently been associated with students' academic achievement. Little is done in the two Senior High Schools in the District to examine the Senior High School mathematics Teachers' Self-Efficacy Beliefs (TSEB) for teaching SHS mathematics. Hence there is a need to examine the Senior High School (SHS) Teachers' Self-Efficacy Beliefs for teaching SHS mathematics in the Central Tongu District

## Purpose of the study

The purpose of this study was to examine senior high school teachers' self-efficacy beliefs in teaching mathematics in the Central Tongu District of the Volta Region of Ghana.

### Objectives of the study

1. To find out the mathematics teachers' self-efficacy beliefs in pedagogy for teaching SHS mathematics.
2. To examine mathematics teachers' self-efficacy beliefs for teaching SHS mathematical content.
3. Determine the overall mathematics teachers' self-efficacy beliefs for teaching SHS Mathematics?

## Research questions

The study is guided by the following research questions

1. What are mathematics teachers' self-efficacy beliefs in pedagogy for teaching SHS mathematics?
2. What are mathematics teachers' self-efficacy beliefs for teaching SHS mathematical content?
3. What are the overall mathematics teachers' self-efficacy beliefs for teaching SHS mathematics?

## Literature Review

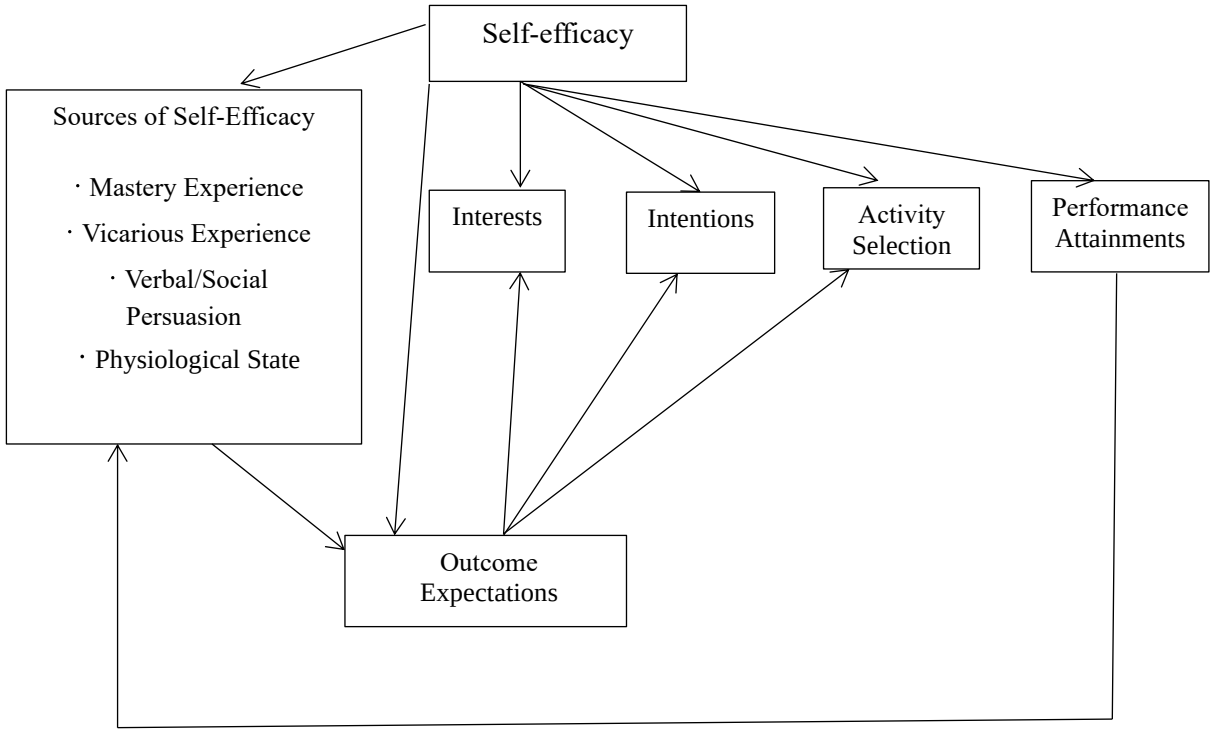
## Theoretical framework

The theoretical framework of a study is the foundation that supports the theory of the study. The theoretical framework sets up the philosophical basis on which research happens and links the theoretical and practical aspects of the problem under study. It describes the theory that explains how and why that research and connects the research to the existing knowledge. The theoretical frameworks of every study have implications for every decision made in the research process (Merten, 1998). The theory that guided this study is the social cognitive theory of Bandura.

## Social Cognitive Theory

The idea of self-efficacy comes from the social cognitive theory of Bandura (1986). According to Bandura (1986), self-efficacy consists of two dimensions which are efficacy expectations and outcome expectancies. An efficacy expectation is a belief in one's capability to execute the behaviour successfully while outcome expectancies are the belief that the behaviour will bring about specific consequences. Regarding the two dimensions of self-efficacy by Bandura, some researchers also refer to teachers' self-efficacy to be in two dimensions. These include teacher personal teaching efficacy, which is referred to as the teacher's belief in his or her teaching effectiveness, and teaching outcome expectancy, which is also referred to as the teacher's belief that effective teaching can result in positive outcomes of student learning regardless of external factors (Enochs, Smith & Huinker, 2000; Swars, Hart, Smith, Smith, & Tolar, 2007).

Self–efficacy of a person determines the magnitude of the person's intention which corresponds exactly with the person's interest and activity selection by the person. These directly influence the outcome variable performance attainments and then had a reciprocal effect on the sources of self-efficacy. Lent, Brown, and Hackett's (1994) model confirmed the reciprocal nature of Bandura's theory this is shown in Figure 1**.**




## Self- efficacy Beliefs Teachers

Self-efficacy plays a very important role in learning. It serves as a driving force in individual learning (Dornyei, 2009; Huang & Chang, 1998). According to Bandura (1993), a Self-Efficacy belief is a belief about one's ability to successfully perform a task very well to expectation or according to one's ability. Bandura, said, "Perceived self-efficacy is concerned with peoples' beliefs in their capabilities to produce given attainments" (2006, p.1). According to Bandura (1993), peoples' Self-efficacy belief affects the goals and the targets they set for themselves and it also determines the effort and the determination they put in place to achieve the goal they set. Usually, people with higher self-efficacy belief set higher goals because they believe in themselves to have a higher capability to achieve the goals. Likewise, people with low self-efficacy belief tend to set lower goals and targets because they believe their capability could only achieve the lower goals. Pajares, (2003) perceived that self-efficacy beliefs determine the outcome of peoples' actions.

According to Bandura (1993), the self-efficacy beliefs of a person can influence him/her in four ways, The way the person thinks about things and other people, how the person feels about things and other people, how the person chooses to motivate himself/herself, and how the person behaves. A study by Bandura (1993) came out that high self-efficacy about the content alone is not enough, one must also have high self-efficacy in how to use the tools and skills to apply the knowledge that one has in the content. In relating to the view of Bandura (2006), Tschannen -Moran and Woolfolk Hoy (2001), mentioned that Teacher efficacies depend on the specific subject matter and the content involve. According to Swackhamer, Koellner, Basile, and Kimbrough (2009), teachers with high self-efficacy exhibit the following attitude during the discharge of their duties: they

1. can engage students to work for a longer period.
2. can identify and recognize student errors they committed easily.
3. can adapt and accept new teaching methods to assist their students to learn better.

Research conducted by Tschannen-Moran and Hoy (2001), indicated that teachers' teaching efficacy influences students' self-efficacy, students' motivation to learn, and students' achievement outcomes. Holzberger, Philipp, and Kunter (2013) reveal that the self-efficacy or teaching efficacy of teachers influences their instructional quality and their general performance. They confirm that there are "significant positive correlations between teachers' self-efficacy beliefs and both the teacher and the student's ratings of instruction quality" (Holzberger et al., 2013, p. 779). Mathematics teachers' Self-efficacy has a great role in learning mathematics in that, it contributes to the motivation of the students ( Dornyei, 2009; Huang & Chang, 1998). Cheung (2008) found out that the number of years of teaching experience is one factor that influenced teachers' efficacy. The teacher training institutions should design their courses to equip the pre-service teachers with some level of knowledge of content and pedagogy. Teachers, who go through these, tend to develop some level of interest in the subject to be efficacious in handling the subject.

## The Mathematics Teachers' Self-Efficacy Beliefs

Even though the mathematics self-efficacy of the students is very essential for learning mathematics, the mathematics teachers' self-efficacy belief is the motivation factor for the teacher to bring about effective learning in a learning environment, (Stipek et al., 2001). Darling-Hammond and Youngs (2002), attest to the fact that the effectiveness of teachers largely depends on the subject matter knowledge of teachers and their ability to communicate that knowledge effectively. Teachers' mathematics self-efficacy is necessary for increasing students' mathematics self-efficacy, Stipek et al., (2001). Tschannen-Moran and Hoy (2001), defined teaching self-efficacy for teaching as a teacher's "judgment of his or her capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated" (p. 783). Swars and Dooley (2010) also defined teaching efficacy in two sections, the first section is the teacher's teaching efficacy which is the teacher's beliefs in his or her skills or abilities to teach effectively and the second section of teaching efficacy is teaching outcome after effective teaching which is having a connection with the student learning. Briley (2012) viewed mathematics teaching efficacy of the teachers as the teachers' beliefs in their skills or abilities to teach mathematics effectively.

Furthermore, Stipek et al. (2001) reveal that there is a significant correlation between a teacher's self-confidence in teaching mathematics and a student's self-confidence in learning mathematics. Teachers' beliefs about mathematics as a subject may differ from their belief in teaching for the understanding of learners. In a way, the teacher's experiences in teaching mathematics could also influence their belief in teaching mathematics and Mathematics as a discipline, (Beswick, 2012). Briley, (2012) acknowledges that teachers' mathematics teaching efficacy could be influenced by the teachers' self-efficacy with mathematics content, their past experiences with the content, and their own beliefs about mathematics.

Therefore, there is a positive relationship between teachers' self-efficacy and experience in teaching mathematics. That is teachers with more years of teaching experience turned to have higher self–efficacy than those with less teaching experience in mathematics, (Takunyaci &Takunyaci 2014). According to Briley (2012), pre-service teachers who have strong efficacy beliefs in teaching mathematics are more likely to have more confidence to teach mathematics effectively and efficiently. Also, there is a positive relationship between teachers' mathematical beliefs and mathematical efficacy for teaching. The teachers who believed that effective mathematics teaching improves students learning were more likely to believe that learning mathematics involves understanding and sense-making.

Some researchers revealed that teachers' mathematics teaching efficacy is a result of the teachers' own past experiences they have as learners of mathematics (Brown,2012; Charalambous et al., 2008; Swars,

2005). Others also said that mathematics anxiety is negatively correlated to mathematics teaching efficacy (Bursal & Paznokas, 2006; Gresham, 2008; Swars, Daane, & Giesen, 2006)

The teachers' self-efficacy beliefs affect their practices in the classroom. According to Ernest (1989) teachers' belief system of mathematics comprised three parts which are:

- Ideas about mathematics as a subject
- Ideas about the nature of mathematics teaching
- Ideas about mathematics learning.

Mathematics anxiety is also another factor that determines the mathematics self-efficacy level of a teacher or students. Mathematics anxiety is the state of nervousness and discomfort brought upon a learner or learners by the presenters of mathematical problems. According to Ashcraft and Moore (2009) students and teachers who have high mathematics anxiety turn to have less toward mathematics problems, regardless of their abilities. Hoffman (2010) pointed out that beginning teachers have a high level of mathematics anxiety which make them have less self-efficacy in term of mathematics teaching. Another researcher also said both pre-service and in-service teachers have reported their level of mathematics anxiety as a major concern in mathematics problem-solving (Bursal & Paznokas, 2006). The presence of mathematics anxiety hurts mathematics self-efficacy beliefs in both the mathematics teachers and students, which also affects the teachers' pedagogical practice (Steele, 1997). Therefore, if a teacher's self-efficacy can be increased, it could help decrease the teacher's mathematics anxiety. Hoffman (2010) revealed that higher levels of self-efficacy could enhance problem-solving efficiency in pre-service teachers. The author found out that self-efficacy, therefore, has a negative relationship with mathematics anxiety.

## Methodology

### Research Design

According to Glatthon and Joyner (2005), the research design is the special and specific plan that guides the researcher in studying a particular problem. This research is to examine the relationship between mathematics teachers' self-efficacy beliefs for teaching SHS mathematics. To carry out the study effectively the researcher adopted a survey research design and a mixed-method approach. Survey research design collects data on a phenomenon and describes it the way it naturally occurs (Amedahe, 2008). Surveys are used frequently in educational research to describe attitudes, beliefs, opinions, and other types of information. The researcher also adopted a mixed-method approach. The mixed method approach is the scientific method of research that blends both quantitative and qualitative research methods in one study (McMillan & Schumacher, 2014; Creswell, 2014). The quantitative analysis was done first before the qualitative analyses to throw more light on the result. Creswell (2014) revealed that qualitative data help to throw more light and give more explanation to statistical results by exploring more information.

### Population

Curry (2008) refers to a population as people with similar characteristics which a researcher wants to study. The researcher's population for this study consisted of all SHS Mathematics teachers and SHS students in the Central Tongu District in the Volta Region of Ghana. There are two Senior High Schools in the Central Tongu District. The two senior high schools had a total number of 1749 students and thirty-six (36) mathematics teachers who form the target population of the study.

## Sample and Sampling Technique

According to Yount (2006), the sample is described as a subset of a population. The same author described a sample size as the number of subjects in a sample. Yount described sampling as a process of selecting a subset of individuals from the estimated population for a study. Gay (1987) suggested a guideline for selecting a good sample that will represent a population. According to Gay,10% of large populations and 20% of small populations are good sample sizes that would represent a research population. Gay (1987) held the view that the key to building representative samples is randomization. Randomization is the process of selecting population members for a given sample, where every member of the population has an equal chance of being selected. In this study, the researcher used the simple random sampling technique for selecting all thirty (30) Mathematics teachers. The simple random sampling technique was used in selecting 30 students for the study, one student in each mathematics teacher's class. According to Alvi (2016), simple random sampling is an example of a probability sampling method in which each member of the population has an equal chance of being selected for the sample. It is a recommendable sampling technique for many kinds of research especially in the case of survey studies because there is no possibility of sampling biases during the sampling process.

## Instrumentation

The research instruments that were used to collect data for the study were questionnaires and a semi-structured interview guide. To examine the mathematics teachers' self-efficacy beliefs with regard to the content and pedagogy for the teaching of mathematics, the questionnaire that was adapted by McGee (2012) is the Self-Efficacy for Teaching Mathematics Instrument (SETMI). McGee (2012) confirmed that Self-Efficacy for Teaching Mathematics Instrument (SETMI) is the most valid and reliable instrument for the measurement of teachers' Mathematics Self-efficacy. The instrument was developed in 2010 according to McGee, (2012) by J. R McGee and can be used to assess teachers' Mathematics Self–efficacy in content and pedagogy. Participants were asked to complete the survey which is in the form of a questionnaire. The instrument consists of 22 questions that assess teachers' self-efficacy for pedagogy and content in mathematics. Items 1-7 assess teachers' self-efficacy in pedagogy for teaching mathematics and items 8-22 assess self-efficacy for teaching mathematics content. The questions used a five-point Likert scale ranging from strongly agrees to strongly disagree. The scale is as follows: A Great Deal (DG=5), Quite a Bit (QB=4), Not Sure (NS=3), Very Little (VL=2) None at All (NA=1). The researcher used a semi-structured interview guide which was designed for students by the researcher based on the research questions. The interview guide consisted of eight questions. The questions were on mathematics teachers' self-efficacy beliefs about the content and pedagogy for the teaching of mathematics. The semi-structured interview guide was administered to the students to confirm mathematics teachers' self-efficacy beliefs about the content and pedagogy for the teaching of mathematics.

## Data Collection Procedure

The questionnaires were administered to the respondents by the researcher directly in the various schools during break and after school for a period of three weeks. The researcher sought permission from the school authorities to administer the questionnaire to the teachers and the students during breaks and after school. The teachers responded to the questionnaire first. Each teacher led the researcher to their respective classes for the researcher to randomly select the students for the study. The interview was conducted during break time and after school. The interview procedures lasted for 10 minutes for each participant. Before the interview, the ethical issues concerning the conduct of the interview were addressed. Therefore, students feel confident to provide the researcher with the needed information. All 30 students are interviewed, one student from each mathematics teacher who was part of the study's classes.

## Data Analysis Procedure

The Self-Efficacy for Teaching Mathematics Instrument (SETMI) questionnaires were analysed with Statistical Package for Social Sciences (SPSS) using descriptive statistics to obtain descriptive information on the individual mathematics teachers' self-Efficacy beliefs for teaching mathematics. Descriptive statistics were also used to analyse the general self-Efficacy Belief for Teaching Mathematics involved in the study. The interview was tape-recorded and then transcribed and coded thematically.

## Results

This study sought to examine the following research questions, what are mathematics teachers' self-efficacy beliefs in pedagogy for teaching SHS mathematics? What are mathematics teachers' self-efficacy beliefs for teaching SHS mathematical content? And What are the overall mathematics teachers' self-efficacy beliefs for teaching SHS Mathematics?

To answer these research questions, the Self-Efficacy for Teaching Mathematics Instrument (SETMI) questionnaire was given to the 30 mathematics teachers to respond to. The data was then analysed to obtain the overall mean and the standard deviation of all 30 mathematics teachers. The result of Self-Efficacy for Teaching Mathematics Instrument (SETMI) was summarized in Tables 1, 2, and 3, the observation guide was discussed to support the findings in the questionnaire.

**Table 1. The mathematics teachers' self-efficacy beliefs in pedagogy for teaching SHS mathematics**

| | | 95% CI | |
|---|---|---|---|
| **SN** | **Rating instrument of TSB** | **Mean** | **SD** |
| 1 | To what extent can you motivate students who show low interest in mathematics? | 4.57 | 0.50 |
| 2 | To what extent can you help your students to value learning mathematics? | 4.43 | 0.63 |
| 3 | To what extent can you craft relevant questions for your students related to mathematics? | 4.47 | 0.63 |
| 4 | To what extent can you get your students to believe they can do well in mathematics? | 4.67 | 0.55 |
| 5 | To what extent can you use a variety of assessment strategies in mathematics? | 4.40 | 0.72 |
| 6 | To what extent can you provide an alternative explanation or example in mathematics when students are confused? | 4.63 | 0.56 |
| 7 | To what extent can you implement alternative teaching strategies for mathematics in your classroom? | 4.43 | 0.63 |
| | **TOTAL** | **4.51** | **0.60** |

The results from Table 1 show a summary of mean ratings of all the 30 teachers' self-efficacy beliefs in pedagogy for teaching SHS Mathematics. It shows that the overall mean rating of all the teachers' self-efficacy beliefs for teaching SHS Mathematics was 4.51, SD=0.60 at a 95% Confidence interval, and the total means range from 4.67 to 4.43. Specifically, the result showed that the respondents strongly indicated that they could get the students to believe they can do well in mathematics (M=4.67, SD=0.55), providing alternative explanations or examples in mathematics when students are confused

(M=4.63, SD=0.56), To what extent can you motivate students who show low interest in mathematics? (M=4.57, SD=0.50), To what extent can you craft relevant questions for your students related to mathematics? (M=4.47, SD=0.63) among others. The lowest among them is to what extent can you use a variety of assessment strategies in mathematics (M=4.40, SD=0.72).

From the interview with the students on mathematics teachers' self-efficacy belief in their classroom and mode of lesson delivery in the two Senior High Schools in the Central Tongu District, it is confirmed that mathematics teachers' self-efficacy beliefs in pedagogy for teaching SHS mathematics is high as indicated by the teacher in the questionnaire. Some of the quotes from the interview:

> "Our mathematics teachers use appropriate examples to explain concepts related to the subject matter to us. Even though it helps our better understanding of the topic, the understanding does not come early. The teachers have to use several examples for a long time before we could understand better (27X)"

> "Our mathematics teachers explain the impact of subject matter on society to us and it helps us to understand the content or the concept, but we feel our teachers could use more of day-to-day life situations to explain concepts to us to enable us to see more mathematics in the society (26X)".

In conclusion, a closer look at the result from table 1. showed that no item was rated below the criterion mean the core of 3.0 indicating that the mathematics teacher's self-efficacy beliefs in teams of pedagogy were strong in all respect which indicated that the mathematics teachers' self-efficacy beliefs in pedagogy for teaching SHS Mathematics was high. The interview findings buttress the findings in the questionnaire.

**Table 2: Mathematics teachers' self-efficacy beliefs for teaching SHS mathematical content**

| SN | Rating instrument of TSB | Mean | SD |
|---|---|---|---|
| **How well can you teach students to understand …** | | | |
| 8 | Sets and Operations on set | 4.60 | 0.62 |
| 9 | Real number system and Algebraic expressions | 4.77 | 0.43 |
| 10 | Surds and Relations and Functions | 4.70 | 0.60 |
| 11 | Plane Geometry and Circle theorems | 4.20 | 0.48 |
| 12 | Linear equations and inequalities and Simultaneous linear equation | 4.57 | 0.50 |
| 13 | Bearing and Vectors in a plane | 4.57 | 0.57 |
| 14 | Statistics | 4.91 | 0.31 |
| 15 | Rigid motion and Enlargement | 4.57 | 0.63 |
| 16 | Ratio and Rates and Variation | 4.74 | 0.45 |
| 17 | Modular arithmetic | 4.73 | 0.43 |
| 18 | Indices and logarithms | 4.60 | 0.56 |
| 19 | Quadratic functions | 4.60 | 0.50 |
| 20 | Mensuration and Trigonometry | 4.47 | 0.57 |
| 21 | Sequences and Series | 4.50 | 0.57 |
| 22 | Constructions | 4.82 | 0.41 |
| **TOTAL** | | **4.62** | **0.51** |

The results from Table 2 show a summary of mean ratings of all the 30 teachers' self-efficacy beliefs in a contest for teaching SHS Mathematics. It shows that the overall mean rating of all the teachers' self-efficacy beliefs in a contest for teaching SHS Mathematics was 4.62, SD=0.51 at a 95% Confidence interval, and the total means range from 4.20 to 4.91. Specifically, the result showed that the respondents strongly indicated that they could handle Statistics (M=4.90, SD=0.31), this was followed by Constructions (M=4.80, SD=0.41), Real number systems and Algebraic expressions (M=4.77, SD=0.43), and Modular arithmetic (M=4.77, 0.43), Surds and Relations and Functions (M=4.70, SD=0.60), among others. The lowest among them are Plane Geometry and Circle theorems (M=4.20, SD=0.48).

The researcher follows up with an interview with the students on mathematics teachers' lesson delivery in the two Senior High Schools in the Central Tongu District, to assess their knowledge of contest delivery and their mastery of the contest, it is confirmed that mathematics teachers' self-efficacy beliefs in teaching SHS mathematics contest are high as indicated by the teacher in the questionnaire. Some the quotes from the interview Some of the quotes from the interview.

> "Our mathematics teachers realize our prior knowledge before class so they can revise it and link it to the new lesson so it helps us understand the lesson very well. Our teachers teach us what we need since they realize our prior knowledge before class 24X".

> "Our mathematics teachers use appropriate examples to explain concepts related to the subject matter to us, It helps our better understanding of the topics 27X".

> "Our mathematics teachers mattered all the topics and he uses multimedia or technologies to express the concept of the subject to us which helps in our understanding of the lesson easily

and we see mathematics as real, it also makes us recall all the lesson; we can even learn when our teachers are not present with us 26X"

In conclusion, a closer look at the result from table 2. showed that no item was rated below the criterion mean the core of 3.0 indicating that the mathematics teacher's self-efficacy beliefs in teaching the contests in the SHS syllabus were strong in all respect which indicated that the mathematics teachers' self-efficacy beliefs for teaching SHS Mathematics contest were high. The interview findings buttress the findings in the questionnaire.

**Table 3: The overall mathematics teachers' self-efficacy beliefs for teaching SHS Mathematics**

| S/N | | M | SD |
|---|---|---|---|
| 1 | The mathematics teachers' self-efficacy beliefs in pedagogy for teaching SHS mathematics | **4.51** | **0.60** |
| 2 | The mathematics teachers' self-efficacy beliefs in content for teaching and content in mathematics | **4.62** | **0.51** |
| | TOTAL | 4.57 | 0.57 |

The results from Table 3 show a summary of mean ratings of all 30 overall teachers' self-efficacy beliefs for teaching SHS Mathematics. It shows that the overall mean rating of all the teachers' self-efficacy beliefs for teaching SHS Mathematics was 4.57, SD=0.57 at a 95% Confidence interval. The two categories of teachers' self-efficacy beliefs for teaching SHS Mathematics were all rated high with the mathematics teachers' self-efficacy beliefs in pedagogy for teaching SHS mathematics (M=4.51, SD=0.60) and The mathematics teachers' self-efficacy beliefs in content for teaching and content in mathematics (M=4.62, SD=0.51)

In conclusion, a closer look at the result from table 3, showed that no item was rated below the criterion mean the core of 3.0 indicating that the mathematics teacher's self-efficacy beliefs in teaching for the SHS syllabus were strong in all aspects which indicated that the mathematics teachers' self-efficacy beliefs for teaching SHS Mathematics high. All the interview findings supported the findings in the questionnaire.

## Findings

1. The teachers' self-efficacy belief in pedagogy for teaching SHS Mathematics was high.
2. The teachers' self-efficacy belief for teaching SHS Mathematics content was high
3. The overall teachers' self-efficacy belief for teaching SHS Mathematics was high

## Discussion of findings

The results from Table 3 showed that the overall mean of the teachers' self-efficacy belief for teaching SHS Mathematics is high. Specifically, the result showed that the respondents strongly indicated that they could handle Statistics, this was followed by Real number system and Algebraic expressions, Modular arithmetic, Constructions, Surds and Relations and Functions, getting the students to believe they can do well in mathematics and providing alternative explanations or examples in mathematics when students are confused among others. A closer look at the result showed that no item was rated below the criterion means the core of 3.0 indicating that the teacher's self-efficacy beliefs were strong in all respect. The finding of this study is in agreement with an earlier finding (Swackhamer, Koellner, Basile, & Kimbrough, 2009, Tschannen-Moran & Hoy 2001, Esterly, 2003; Swars et al., 2007, Wang & Pape, 2007, Holzberger, Philipp, and Kunter, 2013) which established that mathematics teachers with stronger self-efficacy beliefs to teach mathematics effectively were more likely to possess more sophisticated mathematical knowledge but disagreed with

Holden, Groulx, Bloom, and Weinburgh (2011), and Ghanizadeh and Moafian (2014) indicated that teachers' self–efficacy beliefs had consistently been associated with students' academic achievement. The interview result also indicated that mathematics teachers in the district have a higher level of self-efficacy which confirmed the earlier finding.

## Conclusion

Based on the findings of the study, several conclusions have been drawn. Teachers with high self-efficacy beliefs in pedagogy are likely to have a higher level of self-efficacy in teaching mathematical content. That is, teachers with high self-efficacy beliefs influence their persistence effort expended, and perseverance at challenging tasks. The high level of teachers' self-efficacy beliefs in pedagogy and content knowledge for teaching SHS mathematics is not only a guarantee of good performance of students in mathematics. Therefore, the study concludes that the high level of teachers' self-efficacy beliefs for teaching mathematics may not be enough influence for better performance in Mathematics.

## Recommendations

Based on the findings, discussion and conclusions, the following recommendations were made:

1. The school authority and other stakeholders should not only focus on building teachers' self-efficacy beliefs but also focus on other possible factors that could contribute to poor performance.
2. Probe should be launched into the reason why the high teachers' self-efficacy beliefs could not contribute to better performance of students in mathematics.

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