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INVESTIGATING THE RELATIONSHIP BETWEEN TEACHERS' SELF EFFICACY IN TEACHING TRIGONOMETRY AND STUDENTS' MOTIVATION IN LEARNING AND ACHIEVEMENT IN THE SUBJECT: FOCUS ON SENIOR SECONDARY TWO STUDENTS IN THE STATE OF TARABA

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ABSTRACT

For more than two decades now, scholars in education have been intrigued by emerging and unfolding issues having to do with self-efficacy (especially of the teacher), students characteristics and performance. Scholars like Bandura (1982,2006), Muijs and Rejnolds (2001), Podell and Soodak (1995), Clay Son & Sheffet (2006), Nata (2001) have enriched the literature with excellent reports regarding these issues. This paper is yet another scholarly attempt at investigating the relationship between teachers' self-efficacy in teaching trigonometry and students' motivation in learning and achievement in the subject. A sample of 160 senior secondary two students across the state of Taraba was

Introduction

The teaching and learning of trigonometry are essential activities in the study of mathematics in Nigeria. This is because this important aspect of school mathematics, trigonometry, enjoys significant presence in the national mathematics curriculum. A scientific study of the subject of trigonometry is therefore a worthwhile activity. The current researcher was inspired by this significant presence of trigonometry on the national mathematics curriculum to embark on an investigation into this important aspect of mathematics.

There is a world-wide recognition of the role played by motivation in the study of trigonometry in particular and mathematics in general. It is generally accepted that when students (learners) are driven by interest and zeal to study the subject (trigonometry) they will put in lots of efforts. It is known that interest and zeal are important elements of motivation. A concept that is often considered as being deeply rooted in motivation and as a strong determinant of students' academic achievement in trigonometry is self-efficacy (Pajares 1996). The term students' self efficacy is used to refer to cognitive assessment of the capacity of these students to accomplish a particular task. Another definition by Bong (2013) sees students' self-efficacy as students' belief as to whether or not they have the capacity to accomplish a certain task up to the desired targeted outcome. Bong further argued that failure can affect personal self-efficacy but that this effect depends on three things: i) the strength of the individual's existing self-efficacy beliefs; ii) the timing of failure in the entire achievement experiences; and iii) the value of the task to the learner. Inspired by Bong's disclosures, the current researcher developed interest in investigating the relationship between efficacy and students' achievement in trigonometry.

Quite a good number of recent researches conducted on self efficacy are underpinned by the cognitive theory propounded by Bandura (1982). Bandura's social cognitive theory states that individuals make their choices according to the self-knowledge (i.e a perception of self). Further, the national secondary mathematics curriculum has addressed the need to

randomly taken and randomly assigned to control and treatment classrooms in the study. Two out of the six randomly chosen teachers (3 with high efficacy and 3 with low efficacy) were randomly assigned to handle teaching in the treatment and control of classrooms respectively. The teacher self-efficacy questionnaire (TSQ), the student motivation questionnaire (SMQ) and the trigonometry achievement test (TAT), validated by experts, and were used to collect data. The pearson's product moments correlation coefficient (PPMC) method was used to analyze the collected data. Statistically significant correlations were spotted between teacher self-efficacy (TSE) and motivation, attitude, opinion and achievement of students. Recommendations were made based on the findings.

Key Words: Self-efficacy, trigonometry, motivation, teaching, learning, achievement.

understand self-efficacy (i.e) person's judgment of self competence to perform a task or an action) with respect to mathematics in general and trigonometry in particular. It states clearly that a student's objective for studying mathematics or trigonometry is to become self-confident in doing the subject. This forms an important subject of investigation in this study.

Teachers' use of highly influential teaching methods is believed to be a strong aid for improving students' self efficacy. Research literature is replete with reports indicating that teaching methods are related to teacher-efficacy which may or may not improve students' efficacy (Laughran, 1997). Teachers who teach confidently, devote lots of efforts at teaching and used a variety of teaching methods in their classrooms are very likely to have their students' self-efficacy and achievement improved (Ghaith and Yaghi, 1997). This effective teaching, characterized by use of good and varied methods may have influence on students' learning as well as on their desire and ability to work (Nelson, 2007). Nelson's argument here can be interpreted to mean that the teacher's efficacy is not only a strong predictor of students' academic achievement; it is also a predictor of their achievement beliefs (i.e. students' self-efficacy). As a consequence, their level of interest in the subject (trigonometry) is raised and this in turn strengthens motivation. By extension, it can be said that when students learn adequately and have records of repeated success, there exists in them the feeling and belief that they are good achievers in trigonometry. In any case, students will show marks of improved learning with attendant reciprocal rise in the teachers' self-efficacy. to teach trigonometry (teachers will gain greater power to produce more effective teaching). Clearly, this indicates that there is an association between efficacy beliefs in learning and achievement (Pajares, 2002). The current researcher got his inspiration to carry out an investigation into self-efficacies of teachers and students to teach and learn trigonometry respectively from this situation.

From available literature on teaching and learning, reports have been put forward regarding the specificity of self-efficacies. For instance, Bandura (2006) reported that self-efficacy is not only domain-specific; it is also task and situation – specific. This means that it varies from academic settings to academic settings; and from tasks to tasks. As a result, studying efficacies with respect to tasks and academic settings is a worthwhile exercise. Further to this, numerous topics and aspects are involved in the study of mathematics curriculum. Trigonometry is a powerful aspect of mathematics which enjoys a significant presence in the national mathematics curriculum. With this, it become appropriate and important to study self-efficacy of teachers and learners and teaching and learning trigonometry respectively. This forms a basis for the focus of the current researcher's investigation into the relationship between self-efficacies and the teaching and learning of trigonometry.

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Developing in students the ability to carry out a wide variety of complex trigonometric task is a primary goal of teaching and learning trigonometry. This means that doing tasks has a special place in the study of trigonometry. Mathematicians have traced the role of task accomplishment in trigonometry and have illustrated a rich history for it. To many people with literacy in trigonometry, studying the subject is synonymous with doing tasks-solving word problems, creating patterns, discerning situations, interpreting figures, using theorems, etc. Indeed learning to solve problems is the principal reason for studying mathematics and trigonometry (U.S National Council of supervisors of mathematics, 2008). This is a motivating factor for the current researcher to embark on the investigation of the efficacies of teachers and learners to teach and learn trigonometric tasks.

In Nigeria, mathematics in general or trigonometry in particular, is regarded as a cardinal factor in the nation's efforts at scientific and technological advancement due to its links with many other fields of human endeavour (federal ministry of education, 2005). The competencies of students to carry out trigonometric tasks have been linked closely to their efficacies to do those trigonometric tasks. The linkage between learning trigonometry and students' efficacy to do tasks forms the basis for the focus of the study on the relationship between teachers' efficacy and students' achievement in trigonometry.

Students' self-efficacy plays a critical role on their achievement in trigonometry as a result of its influence on motivation (Zimmerman, 2000). Also, an association exists between students' self-efficacy and their choices, their choice patterns and emotions and the degree of efforts they put into the learning tasks. Further students' educational and career decisions and ability to set attainable goals to complete a task are influenced by self self-efficacy (Martinez and Kopala, 1999). These laudable revelations are useful sources of inspiration for the researcher to embark on the investigation of efficiencies versus teaching and learning.

To achieve means to succeed (in doing something, the reach a goal) (De Jager-Haum, 2000). Achievement therefore is a measure of success in doing something. In education, achievement is measured by the scores testees are able to make in a test. With this in mind, the trigonometry achievement of participating students in this investigation was measured by the scores they were able make in the trigonometry test. In this study, the relationship between teachers' self-efficacy in teaching trigonometry and student's achievement in the subject were explored.

Statement of the problem

The study of trigonometry, a significant component of the senior secondary school mathematics, enjoys a very prominent presence in the national mathematics curriculum. Studying trigonometry provides worthwhile opportunities for students to solve word-problems, create patterns, discern situations, interpret figures, use theorems and do some other scientifically inclined activities that promote critical thinking and problem solving. However, these laudable scientific features promoted by studying trigonometry are being challenged by the seeming feeling of fears exhibited by students in the study of the subject. To support this argument, Eiaikhuemen (2013), declared: geometry and trigonometry are aspects of school mathematics which students dislike because they feel they are difficult and not easy to understand. Teachers need to have special competence and perseverance to handle the teaching of trigonometry such that students can have the motivation to study the subject and make significant achievement. Empirical evidence is available linking self-efficacy in teaching to students' motivation and learning. The problem of this study is to investigate with a view to finding out whether teachers' self-efficacy in teaching trigonometry has relationship with students' motivation and achievement in the subject. Posed as a question, is there any relationship between teachers' self efficacy in teaching trigonometry and students' motivation and achievement in the subject?

Purpose (Objective) of the study

The purpose of this study generally is to determine the relationship between teachers' self-efficacy in teaching trigonometry and students' motivation and achievement in the subject. Specifically, the purpose of the study is to determine the relationship between:

i. Teachers' self efficacy in teaching trigonometry and students' motivation to learn the subject;
ii. Teachers' self-efficacy in teaching trigonometry and students' achievement in the subject;
iii. The self-efficacy of students to learn trigonometry under teachers with high or low self-efficacy to teach trigonometry
iv. The mean achievement scores of students of highly efficacious teachers and the mean achievement scores of students of lowly efficacious teachers;

Significance of the study

This study is significant to four (4) different categories of people: trigonometry students, trigonometry teachers, trigonometry educators (i.e teachers of teachers of trigonometry) and proprietors of schools (public and private),

This study is significant to trigonometry students because it enhances the development of imaginative and creative thinking in them. Many of the students' activities in the study and indeed trigonometric activities of other students generally, are so prepared that students are required to discern and visualize trigonometric figures, and to use properties of these discerned figures to solve problems. By so doing, an opportunity is created for these students to develop imaginative and conceptual understandings, through creative thinking, in order to understand trigonometric phenomena. Hence imaginative (creative) thinking is enhanced. Enhancement of imaginative or creative thinking leads to development of self confidence. With self-confidence, students begin to respond confidently and confident responses are signs that the students really understand. Confidence in doing trigonometry is a mark of high efficacy in learning the subject.

This study is also significant to trigonometry teachers because from it, these teachers will be exposed to information about efficicacies (high and low) and their relationship with teaching and learning. Teachers will thus be guided to work toward improving their competence to teach and persistence and the development of abilities to manage students' problems and improve their learning.

To trigonometry educators, gathered information from this investigation will guide them in selecting, organizing and presenting materials to trigonometry teachers on the best way to improve their self-efficacies in teaching trigonometry. Would be teachers in trigonometry or teachers being prepared for teaching trigonometry, would also benefit from this study in the same way.

School proprietors are also targeted beneficiaries of this study. Information from the study will make them see the need for creating opportunities and enabling environment for training and retraining of trigonometry teachers with a view to improving their self-efficacies. They will also see the need to come up with programs that will not only motivate students to learn trigonometry but also achieve well in the subject. It is also felt that the study will serve as a ground from which further researches on teachers' and students' self-efficacies will spring up.

Scope of the study

This study is restricted to the exploration of the relationship between teachers' self – efficacy in teaching trigonometry and student's motivation and achievement in trigonometry. In specific terms, the study is limited to the following:

i) Senior secondary (SS 2) classes of students in Taraba state;
ii) Trigonometric task relevant to SS2 classes;
iii) Self-efficacy of teachers, especially those teaching trigonometry and
iv) Self-efficacy motivation and achievement of trigonometry students in the state of Taraba.

Research questions

The following research questions guided the conduct of the study:

1. What is the relationship between trigonometry teachers' self-efficacy and students' motivation in learning trigonometry?

2. What is the relationship between trigonometry teachers' self- efficacy and students' achievement in trigonometry?
3. What is the mean achievement score of students learning trigonometry in classrooms with high efficacy teachers?
4. What is the mean achievement score of students learning trigonometry in classroom with low efficacy teachers?

Research hypotheses

The following statements of hypotheses were formulated and tested at the 0.05 (5%) level of significance:

H_{01}: Teachers' self-efficacy in teaching trigonometry is not significantly related to students' motivation to learn trigonometry,

H_{02}: Teachers' self-efficacy in teaching trigonometry is not significantly related to students' achievement in trigonometry and

H_{03}: There is no significant relationship between the mean achievement scores of students in classrooms with high and low teaching efficacies.

Method (s)

This investigation employed the use of an exploratory quantitative design to explore the relationship between teachers' self efficacy (TSE) in teaching trigonometry and students' motivation and achievement in trigonometry. The term quantitative research is used to refer to an enquiry into social problem wherein a phenomenon is explained through the collection of numerical data for analysis in which mathematically based methods (or quantitative methods are used) (Aliaga & Gunderson, 2002). In other words, a quantitative paradigm was used since the theory underpinning the study was tested and measured by using statistical procedures. Clearly this was an indication of a quantitative enquiry (Cresswell, 1994). This paradigm (quantitative research) was used to discover how many and what kinds of people in general have a particular characteristic in the sampled population (Branen 1992). Simply put the design of this study whose aim was to investigate the relationship between teachers' self-efficacy (TSE) and students' motivation and achievement in trigonometry was a reflection of the principles of qualitative research.

A sample of a one hundred and sixty (160) senior secondary two (SS2) students was randomly taken and used for the study. Again, three (3) out of the one hundred and eighteen (118) public secondary schools were randomly sampled and used. The cluster random sampling technique was used for choosing the three schools. In other words, public senior secondary schools in the state (all the 118) were clustered into 3 using each of the three senatorial zones as a cluster i.e. Taraba north, Taraba central and Taraba south. A school was chosen from each of these clusters through randomization by balloting. Each of the three randomly chosen schools was named schools 1, 2 and 3. Regarding the selection of learner participants, simple random sampling was used to select two intact classes from each of the 3 randomly chosen schools. All learners in the 6 randomly chosen intact classes participated in the study. Table 1 (below) shows the distribution of learners according to the 3 chosen schools:

Table 1: Distribution of leaner participants according to schools:

Schools	**1**		**2**		**3**		
Classes	A	B	C	D	E	F	**TOTAL**
Males	17	16	18	17	17	12	97
Females	11	10	10	10	12	10	65
Total	28	26	28	27	29	22	160

Source: Field Study (2023).

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All the 160 learner- participants were later assigned to either of treatment or control groups. This was easily done by the random assignment of the intact classes to these groups. Through sampling by balloting, classes A, D and F were assigned to the treatment or experimental group i.e group taught by teachers with high self-efficacy. On the other hand, classes B, C and E were assigned to the control group i.e group taught by teachers with low level of self efficacy. Six teachers, three classified as having high efficacy and 3 too classified as having low efficacy were randomly assigned to treatment and controlled classes respectively. After treatment and control activities, both teachers' and students' questionnaires were administered to generate data for classifying teachers into efficacy levels. Thereafter, the trigonometry achievement test (TAT) was administered to students to measure their achievement levels. The teacher self efficacy questionnaire (TSQ), students motivation questionnaire (SMQ) and the trigonometry achievement test (TAT) were validated by three prominent mathematics teachers from the three sampled schools and the by three giant trigonometry educators, one each taken from Taraba state University (TASU), Jalingo, Modibbo Adama University (MAU) Yola and Nnamdi Azikiwe University (NAU), Awka. Reliability of the TSQ, SMQ and TAT was estimated by using pilot studies for the questionnaires and test retest reliability approach for the trigonometry test. Pearson's product moments correlation coefficient method (PPMC) was used to get reliability coefficients of 0.85, 0.81 and 0.83 for TSQ, SMQ, and TAT respectively, indicating that the TSQ, SMQ, and TAT were reliable instruments.

Experiment procedure

To obtain information on which investigational outcomes and conclusions were based, teacher participants received exhaustive briefing on how to respond to items on the TSQ (teacher self efficacy questionnaire). Following this briefing, the questionnaire was administered to the teachers who were requested to respond to items on it. Data were generated from their responses on the basis of which the teachers were sorted into three (3) groups according to their levels of self efficacy (LSE). These levels are high, medium and low. A teacher from each of the high and low efficacy groups was randomly chosen and assigned to teach in the treatment and control classes respectively. After sessions of instructions, students also received separate briefing on how they were to fill in their responses to items on the SMQ (Student motivation questionnaire). Satisfied that the students now understood the "how" from the briefing, the researcher administered the SMQ and the students responded. Data so generated from their responses were analysed, using the SPSS software to determine their motivational levels. Already they had received instructions either in the treatment or control classrooms. The treatment classroom had highly efficacious teachers handling instructions while lowly efficacious teachers handled theirs in control classroom. After sessions of these classroom activities by the two groups, the trigonometry achievement test (TAT) was administered to both groups to obtain measures of their performance for correlation. As stated above, data generated from students' responses to the SMQ were analyzed using the SPSS software to determine the levels of motivation of these students. The mean and standard deviation scores were used to answer the research questions while the statistics used to answer the research question while the PPMC statistics was used to test the stated null hypothesis for truth and significance. Testing was done at the 0.05 (5%) level of significance.

Results

This component of the research report is reserved for the presentation and analysis of results. The said results are presented in tables. Each table is preceded by a research question and the table's content answers the research questions. Following each research question is a statement of hypothesis for testing at the 5% level significance. The hypothesis testing was done by using the PPMC statistic. At the end of the summary of each result, a statement is made, accepting or rejecting the stated null hypotheses. PPMC is an abbreviation for Pearson's product moments correlation coefficient, sometimes simply called Pearson's r.

Research question 1: What relationship exists between teachers' self-efficacy in teaching trigonometry and students' motivation to learn trigonometry?

H_{01}: There is no significant relationship between teacher self-efficacy in teaching trigonometry and student achievement in trigonometry.

Data for answering question 1 are presented in table 2 below:

Table 2: Relationship between teachers' self- efficacy in teaching trigonometry and students' in learning trigonometry.

		Teacher self-efficacy	Students' motivation
Teacher self-efficacy	Sig. (2-tailed) N	1	.785(**)
Student's motivation	Pearson r Sig. (2-tailed) N	160 .785(**) .000 160	160 1

** Correlation is significant at the 5% (0.0) level (2-tailed).

Source: Field Study (2023).

From the data in table 2, the calculated value of r (which is the coefficient of correlation) is 0.785 or 0.79. Clearly, this indicates that there is a high positive relationship between teacher self-efficacy in teaching trigonometry and students' motivation in learning trigonometry. Further, this value of r (0.79) is a clear indication that 62.41% of the variance noticed in students' motivation to learn trigonometry was due to teachers' self-efficacy. It is equally important to investigate the relationship between teachers' self-efficacy and various aspects of students' motivation to learn trigonometry so as to have a more comprehensive exploration of such relationship. The result of this investigation is presented in table3 below:

Table 3: Relationship between teacher self-efficacy and various aspects of the SMQ

		Teacher self-efficacy	Intrinsic	Extrinsic	Attitude	Opinion
Teacher self-efficacy	Pearson r Sig.(2tailed)	1	.572	-.267	.771	.462
	N	160	160	160	160	160

** Correlation is significant at the 0.05 (2-tailed) level

Source: Field Study (2023).

Data ii table 3 show that there is a positively, statistically significant relationship between teacher self-efficacy and the various aspects of motivation investigated (i.e intrinsic, attitude and opinion). The relationship between teacher self-efficacy and students' extrinsic motivation is however not significant. This surprisingly means that students are lowly extrinsically motivated to learn trigonometry in classrooms that are handled by highly efficacious teachers.

Research questions 2:

What relationship exists between teachers' self-efficacy to teach trigonometry and students' achievement in trigonometry?

H_{02}: There is no significant relationship between teachers' self-efficacy to teach trigonometry and students' achievement in trigonometry. Data for answering question 2 and testing hypotheses 2 are shown in table 4 below:

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Table 4: relationship between teacher self-efficacy and students' achievement

		Teachers self-efficacy	Students' achievement
Teachers self-efficacy	Pearson r Sig. (2-tailed)	1	.722(**)
Students' achievement	N	160	160
	Pearson r Sig. (2-tailed) N	.722(**) .000 160	1

** correlation is significant at the 5% level (2 tailed).
Source: Field Study (2023).

As can be seen from the data in table 3 (above), the coefficient of correlation, r, has been found to be 0.72. This shows in similar respect, that a strong positive statistically significant relationship exists between teachers' self-efficacy and students' achievement in trigonometry. It is also noticed that 51.84% of the variance observed in students' achievement was accounted for by teacher self-efficacy.

Research question 3:
What is the mean achievement score of students learning trigonometry in classes with low efficacy teacher (treatment group)?

Research question 4:
What is the mean achievement score of students learning trigonometry in classroom with low efficacy teacher (control group)?
H_{03}: There is no significant relationship between the achievement of treatment students and that of control students.
Data for answering questions 1 and 2 and for testing hypothesis 3 are presented in table 5 below.

Table 5: Relationship between achievement of treatment and control students

Group	Mean	Std. deviation	N
Treatment	6.07	5.55	80
Control	6.00	4.27	80
Correlation matrix			
	Treatment	Control	
	Pearson r Sig. (2-tailed) N	 80	 80
	Pearson r Sig. (2-tailed) N	.811* .000 80	1 80

** Correlation is significant at the 0.00 level of significance (2-tailed).
Source: Field Study (2023).

Data in table 5 reveal the following:

i. Students in the treatment classroom have higher mean and standard deviation scores (6.07 and 5.55 respectively) than the mean and standard deviation scores (6 and 4.27 respectively) of the control students.

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ii. This means that the control students have lower mean and standard deviation scores.

iii. The correlation coefficient, r, calculated as 0.81 signifies the existence of a strong positive relationship between the achievement of students in the classroom with highly efficacious teacher and that of students in the classroom with lowly efficacious teacher. Again, 65.61% of the variance between the achievement of treatment and control students was attributed to teacher efficacy.

Summary of Findings

The following findings emerged from this investigation:

1. A significant relationship exists between teachers' self-efficacy in teaching trigonometry and students' motivation in learning the subject since it was observed from the study that 62.41% of students' motivation to learn trigonometry was due to teacher efficacy in teaching the subject.
2. A positive, statistically significant relationship was spotted between teacher self-efficacy and students' intrinsic motivation, attitude to learning and opinion about learning trigonometry.
3. A low negative relationship exists between teacher self-efficacy and students' extrinsic motivation in learning trigonometry.
4. A statically significant relationship exists between teacher self-efficacy and students' achievement in trigonometry
5. Students in the classroom with high efficacy teacher (treatment) had higher mean and standard deviation scores than those of students in the classroom with low efficacy teacher (control)
6. Conversely students in the classroom with low efficacy teacher (control) had lower means and standard deviation scores than those of students in the classroom with high efficacy teacher (treatment).
7. It was also discovered that a strong positive relationship exists between the achievement of students in the classroom with highly efficacious teacher and that of students in the classroom with lowly efficacious teacher.

Discussion

From the outcomes of this investigation, it is easy to observe that teacher efficacy, student motivation and achievement are three important variables in the teaching and learning of trigonometry and that they are related. For instance, it was discovered in the study that a significant relationship exists between teacher self-efficacy to teach trigonometry and students' motivation to learn the subject. Not only this, the discovery further showed that 62.41% of the variance observed in student motivation to learn trigonometry was accounted for by the teacher efficacy in teaching this great subject. This means that the greater the efficacy of the teacher is to teach trigonometry the more motivated students are to learn the subject. Mojavezi and Tamiz (2012) made a similar discovery regarding relationship between teacher efficacy and student motivation to learn languages. These researchers' investigation regarding the relationship between teacher self-efficacy (TSE) and student motivation revealed that the higher the TSE level of the teacher, the higher the students' motivation level. This clearly exposes the similarity between the findings of these researchers and that of the current investigator. Another striking similarity between the findings of the two researches, one by the current investigator and the other by Mojavezi and Tamiz (2012) concerns the relationship between TSE and students' extrinsic motivation. Both studies reported that the higher the TSE level of the teacher, the lower the students' extrinsic motivation level. Is this not a surprising situation?

Other aspects of motivation explored by this study are intrinsic motivation, attitude to learning and opinion about learning trigonometry. The study found the existence of a statistically significant correlation between TSE and students' intrinsic motivation, attitude to learning and students' opinion about learning trigonometry. The meaning of this is that students in this study were strongly intrinsically motivated in their

learning of trigonometry, had positive and friendly attitudes toward learning of trigonometry, had positive and friendly attitudes toward learning the subject and expressed receptive and encouraging comments and opinions about learning trigonometry. These are excellent ingredients in the learning of any subject. Mojavezi and Tamiz (2012) had similar findings.

A further important discovery that was made by this investigation was the existence of a statistically significant relationship between TSE and students' achievement in trigonometry. A meaning to be given to this discovery is that students' achieved according to teacher efficacy levels. In this study, where the TSE level was high, student achievement was corresponding high. Conversely where the TSE level was low, a corresponding low student achievement was reported. In a similar investigation into the relationship between TSE and students' achievement, Ross (1992), took a sample of 18 grades 7 and 8 history teachers in 36 classrooms and correlated TSE with students' achievement. It was found that students in classrooms having teachers with greater confidence in the effectiveness of education, an indication of a high TSE level, had higher achievement. This discloses a similarity between Ross's finding and that of current investigator.

Still regarding student achievement, this investigation uncovered that students in classrooms with teachers having high efficacy level had higher mean and standard deviation scores than those of students' in classrooms with teachers having low efficacy level. The converse was also the case. Students' in classrooms with teachers having low efficacy level have lower mean and standard deviation scores than those of students in classrooms with teachers having high efficacy level. In similar separate studies Muijs & Rejnolds (2001): Tournaki & Podell (2005); Allinder (1994); Chacon (2005): and Podell & Soodak (1993) reported varying degrees of the influence of TSE on students' achievement.

Implications of the findings for Education

It is clear from this research that the findings of this study have far reaching implications for education. These far reaching implications are noticeable with respect to students, teachers, educators and curriculum designers or planners. For instance, it was reported from this investigation that students from classrooms handled by teachers having high TSE levels have high achievement in trigonometry. On the other hand, those students who participated in the study in the classrooms handled by teachers having low TSE levels have low achievement in the subject. The implication of this finding for the classroom is that efficacy level in teaching determines success level in learning. That is to say that if the level of efficacy in teaching is high, the teaching efficacy level of success in learning is correspondingly high. But if the teaching efficacy level is low, it is matched by a low success level in learning. Unfortunately, the practice in the study area is such that teachers are assigned to handle teaching without any regard for efficacy levels. Learning problems can be expected from the situation as majority of the students are made to learn trigonometry whose teaching is handled by lowly efficacious teachers.

This study also reported a significant correlation between TSE and student motivation in learning trigonometry. A sense to be made out of this is that when teaching is handled by a highly efficacious teacher, students are highly motivated to learn the subject taught by this teacher. Conversely, when the handler is a lowly efficacious teacher students are lowly or not even motivated to learn the subject taught by him or her. The implication of this for the classroom is that student motivation rises or falls according to the efficacy level of the teacher. In other words, if teaching is handled by a highly efficacious teacher, the zeal or interest to learn is created or generated, strengthened and sustained or maintained. Hence the drive to learn is always in place. In this situation, meaningful learning can be expected. The reverse is likely if teaching is handled by a teacher with low teaching efficacy level. Only a weak zeal or interest to learn is created on the part of the student. It may not even be created in the first place. Under the situation, only a small or no learning can occur. Other aspects of motivation explored by this study, which are significantly related with students' learning level, are attitude and opinion. Teaching from a teacher with high TSE make students to develop positive attitudes to learning trigonometry and to express friendly, receptive and embracing opinions about

such learning. TSE is therefore a powerful ingredient in the teaching/ learning situation. As a consequence, trigonometry teachers are to work toward acquiring teaching efficacy, teacher educators are to educate teachers about TSE and curriculum planners are to come up with programmes that can facilitate the attainment of TSE.

Conclusion

It was concluded from this investigative study that:

1. A significant correlation exists between teachers' self-efficacy (TSE) in teaching trigonometry and students' motivation in learning the subject and that 62.41% of students' motivation to learn trigonometry was due to TSE level of the teacher.
2. A positive statistically significant relationship was spotted between TSE and students' intrinsic motivation, attitude to learning and opinion about the leaning of trigonometry;
3. A low (weak) negative relationship exists between TSE and students' extrinsic motivation in learning trigonometry.
4. A statistically significant relationship exists between TSE and students' achievement in trigonometry;
5. Students in the classroom with high TSE teacher (treatment) had higher mean and standard deviation scores than those of students in the classroom with low efficacy teacher (control);
6. Conversely, students in the classroom with low efficacy teacher (control) had lower mean and standard deviation scores than those of students in the classroom with higher efficacy teacher (treatment)
7. A strong positive, relationship exists between the achievement of students in the classroom with a highly efficacious teacher and that of students in the classroom with lowly efficacious teacher.

Recommendations

The following recommendations were made based on the findings of this study:

1. Trigonometry teachers' are advised to take up programmes in faculties of education that acquaint them with global best practices in the teaching of trigonometry in order to develop themselves. They should equally patronize workshops, teachers' conferences and seminars, and other relevant means for further self –development on the job. On the job (in-service) training is not only important, it is a needed tool for the development of teacher effectiveness. Through such training, the trigonometry teachers have opportunities for developing self-efficacy convictions to make them provide sound pedagogies for their students and to arrange more effective, impressive, creative and interesting courses and curriculum in their classrooms. The training will for sure help those teachers experience and experiment a wide variety of teaching techniques rather than sticking to the same traditional method(s) (if they do not train on the job). They also have a chance to acquire skills needed to provide students with special and interesting learning needs. Equally well, they stand the chance of getting help as to how to manipulate situation and figure out how to solve problems in their classrooms. All these are essential elements in building teacher self-efficacy and improving students' motivation and ultimately achievement in trigonometry.
2. Teacher educators should make conscious efforts at educating trigonometry teachers about efficacy in teaching. Essentially, these teachers should receive a wealth of education from these educators regarding the sources of TSE as spelt out in Bandura's (1986) social cognitive theory i.e enactive mastery, vicarious experience and verbal persuasion. This wealth of education should include practices that can help the trigonometry teacher attain to these sources of TSE.
3. Curriculum designers/ planners have a role to play by coming up with training programmes that can facilitate the development of TSE by trigonometry teachers.

4. Governments, proprietors, parents, philanthropists, and others that have stakes in education should support teacher- education at all levels, especially for trigonometry/ mathematics teachers, and especially with respect to development of TSE, so that they become better teachers to handle trigonometry teaching more properly for students to learn more meaningfully.
5. Trigonometry teachers are called upon to embrace, and not resist, all the global best practices learnt or to be learnt as recommended by this study.

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