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A SURVEY OF MATHEMATICS TEACHERS' EFFICACY AS CORRELATES OF SENIOR SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN MATHEMATICS IN DELTA STATE.

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Abstract: *The study examined Mathematics teachers' efficacy as correlates of senior secondary school students' achievement in Mathematics in Ughelli education zone of Delta state. Correlational research designed was employed. The population of the study covered all the Senior Secondary School 3 (SSS3) Mathematics students and all the mathematics teachers teaching senior secondary schools in the 2 Local Government Area of Ughelli Education Zone in Delta State. Simple random sampling was applied to selected 7 schools out of the entire population. A sample of 160 students and 20 Mathematics teachers were randomly selected from the schools in the 2 Local Government Areas of study. The instruments for data collections are Mathematics teachers' Efficacy scale Questionnaire (MTSES) and Mathematics Achievement Test (MAT) were used to elicit information from the respondents. The instruments were validated by three experts from department of measurement and evaluation; mathematics and Curriculum studies whose correction and comments enhanced the final draft production. The test-retest method was used to determine the reliability coefficient. The coefficient total of 0.83 was obtained using cronback alpha method. The research questions using pearson product-moment correlation. Linear regression analysis was used to test hypotheses 1 – 3 while hypothesis 4 was tested using multiple regression analysis. The results revealed among others that: There is no significant relationship among Mathematics teachers' efficacy in instructional strategies, students' engagement, classroom management and students' achievement in senior secondary Mathematics in Ughelli Educational zone of Delta state. Though the overall model analysis reveals that Mathematics teachers' efficacy predicts students' achievement but students' engagement have more predictive effect on students' academic achievement.*

Keywords: *Teacher efficacy, Instructional strategies, Students' engagement, Mathematics teachers.*

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Introduction

Teachers are very crucial to the development of any society and the success of its educational system. Realizing an efficient education and training individuals up to the desire level in Mathematics depend on teachers who are well grounded in mathematical teaching method. In fact, the quality of any educational system is a reflection of the quality of its teachers in terms of experience, competency, commitment and level of dedication to their core roles. As no educational system can rise above the quality of its teachers, that prompted the federal government to always emphasized the training and retraining of teachers in different subject areas at all level of education (FRN, 2013). These subject areas includes: English language, sciences, Arts, Social sciences, Mathematics and others.

Mathematics as a core discipline is generally seen as a language of science. Both pure and applied sciences could not have developed without Mathematics. Hence, Mathematics is referred to, as the queen of all subjects, such as Physics, Chemistry, Biology, Accounting, Economics e.t.c (Ukeje, 2005). It places

emphasis on logical structures demanding precision of taught and expression. Hence it is the science of numbers thus essential in almost every field and events, such as, daily transactions which involves money exchange, interpreting graphs and charts, information communication and technology, fashion and design, measurement in carpentry workshops and technical. Thus Mathematics as a subject is sometime described as the mother of all learning, in which other subjects derive their basis from, both in the arts and sciences. . In acknowledging the importance of Mathematics and contribution of Mathematics to the modern culture and technology, Ukeje (2005) opined that:

> *Without Mathematics, there is no science; without science there is no modern technology and without modern technology there is no modern society. In other words, Mathematics is the precursor and the queen of science and technology and indispensible single element in modern societal development (p.82)*

In-spite of the usefulness of Mathematics, most secondary school students have had a negative perception and attitude towards Mathematics. This monotonous rhythm of boredom which has planted a common impression in student is quite a close echo. This view has eaten into the minds of students with "I cannot make it" declaration in Mathematics. In-fact, some students are of the impression that the chains of formula of Mathematics can lead to mental derangement while others capitalize on its abstraction. These are flimsy excuses that make them soar out of the class as soon as the Mathematics teacher steps into the class. If students are busied up on a discourse about their best subject, some snap their fingers over their head at the say of Mathematics with a hiss which evidence how hatred swells and glisten in their veins for the subject.

Consequently, statistics from many authors such as Asikhia 2010, Olaoye 2011, Kolawole & Udeh 2012 Anaduaka & Okafor 2013, Salako & Ogundipe 2017 revealed a very high percentage of failure in senior school certificate Mathematics. This perhaps may be as a result of so many parameters such as lack of readiness of student to learn Mathematics, unsuitable teaching methods and approaches applied by teachers, lack of passion for the teaching profession occasioned by poor pay and low respect from the society, inadequate qualified and seasoned teachers to teach the subject, lack of mastery of subject matter by some Mathematics teachers, most Mathematics teachers are not computer literate , lack of learning materials, lack of learning space and un-conducive learning environment and others, which may have contributed to poor academic achievement in Mathematics.

> Bakare in (Anaduaka & Okafor 2013) described poor academic achievement as any achievements that falls below an expected standard. While according to Aremu (2013), poor achievement is any achievement adjudged by the examinee/testee as falling below an expected standard. In-fact, the students' academic success may be seen as a ladder on which one climbs up to the upper stratum in the society.

Several researchers had reported the influence of school type, location, gender on students' achievement in Mathematics. Alutu and Eraikhuemen,(1999) observed that there was appreciable difference in academic performance in favour of private schools in 1996 and 1998 for JS3 students in Egor Local Government Area of Edo State. Some researches revealed significant differences in

Mathematics achievement of urban and rural schools and urban students outperformed their rural counterparts (Eraikhuemen 2003, Owoeye 2011). Eraikhuemen continued that there was an interactional influence of gender and school location on their achievement in Mathematics. On the other hand, Maliki, Ngban and Ibu (2009) posit that rural schools' students outperformed their urban schools counterpart in Mathematics. Ahunsi and Eraikhuemen (2014) reported the poor performance of students in Mathematics. According to their findings, students' academic achievement in Mathematics is dependent on gender, school type and interaction effect of both. They noted that male students performed better in Mathematics than their female counterpart. Ahunsi and Eraikhuemen (2014) continued that the reason for poor academic achievement of students may not be unconnected with cognitive learning style favouring male students in Mathematics. Therefore, we must ensure that, the knowledge of Mathematics is adequately dispatched, delivered and also received by the students irrespective of the cognitive differentials between male and female students. As such Okemakinde, Alabi and Adewuyi (2013) reported that the body of knowledge in Mathematics is holistically procedural and systematic, which helps to equip students with lifelong skills such as thinking skills, reasoning skills, communication skills, collaborating or team skills, tolerance, information searching skills, decision making skills, and information utilization skills.

Sequel to this, the teaching of Mathematics requires an efficacious teacher. An effective Mathematics teacher according to Ezenweani (2006) is the one who provides the conducive social atmosphere to enable the learners interact in a social setting with human and non-human resources and to manipulate the tangible content of Mathematics with a view to internalize the virtue of mathematical knowledge and skills. Mathematics teachers are those teachers that are professionally qualified to teach Mathematics in senior secondary schools. They include those with B.Sc (Ed), B.Sc plus PGDE, M.Sc (Ed) and PhD in Mathematics education. Teachers who are well qualified in using a variety of effective pedagogical strategies; and those who possess a disposition towards teaching Mathematics that inspires, motivates and encourages their students to learn Mathematics. Highly efficacious Mathematics teachers can be seen in this work as those who are proficient in classroom management, student engagement and instructional strategy.

Teachers' efficacy is thought to mean teachers' confidence in their ability to promote students' learning (Hoy 2000) cited in Alrefaie 2015). Teachers' efficacy is the set of beliefs teachers hold regarding their abilities and competencies to teach and influence student behavior and achievement regardless of outside influences or obstacle. It is the teachers' belief related to efficacy on managing and operating successful teaching through students' engagement, classroom management and instructional strategies,

Instructional strategies depict how the teacher or instructor will plan and work towards the kind of learning activities he has chosen for the students. It shows how the teacher carefully and systematically arranged materials and content following principles of necessary antecedence and difficulty. Teachers' instructional strategies are influenced by their sense of efficacy beliefs (Caprara, Barbaranelli, Steca & Malone, 2006). Therefore, teachers' sense of efficacy is assumed to influence

teachers' instructional practices in the classroom.

Classroom management is teachers' ability to control disruptive behavior in the classroom which is classroom management is very important. However, this situation requires an experienced teacher who must have spent up to 10 years and above Murat, Ramazan and Mucahit (2018). Lack of this ability may lead to wasted instructional time and will contribute to teacher stress and burnout. Based on Bandura's theory, Dicke, Parker, Marsh, Kunter, Schmeck, and Leutner (2014) assumed that teachers' efficacy beliefs not only influence teachers' behaviors in the classrooms, but also teacher' efficacy beliefs affect the success of teachers' classroom management as well as students' engagement.

Students' engagement is the demonstration of expertise in how a teacher helps students to develop the capabilities and competencies necessary for active participation in classroom lessons. Several studies have examined the relationship between Mathematics teachers' efficacy and students' engagement in the classroom as well as its impact on students' achievement (Skinner & Belmont, in Alrefaei, 2015).

Students' academic achievement entails the quality and level of commitment in carrying out a particular activity such as seeking for mathematical solution to problems. Students' achievement in Mathematics can best be measured by the amount of knowledge the learners have acquired in the course of teaching and learning via teachers' efficacy. Student level of achievement can be attained base on the teachers' relationship with both the student learning and interaction with the students. For this to be done, the teacher must understand the developmental progress of students, especially such issues as students cognitive and cultural diversity which are essential for laying the foundation of an effective and successive learning outcome.

Students' achievement in Mathematics is a reflection of Mathematics teachers' efficacy. Studies have shown that Mathematics teacher efficacy is an important variation in teachers' effectiveness that is related consistently to teacher behaviors and student outcomes (Bray-Clark and Bates 2003). The assumption by some people that teachers with low efficacy cannot be effective is supported by Podell and Soodak (cited in Kola & Sunday, 2015). It can be argued that high efficacious teachers are more apt to produce better student outcomes because they are more persistent in helping students who have problems. Studies revealed that teachers who have a high level of efficacy regarding their ability to teach can produce super stars student outcome across a range of academic disciplines. It is believed that teachers who have high efficacy will spend more time on student learning, support students in their goals and reinforce intrinsic motivation. Barnes (cited in Kola & Sunday, 2015) posited that there is a positive correlation between efficacy and teacher effectiveness. Barnes went further to put forward that teachers' efficacy account for individual differences in teacher effectiveness and student academic achievement. Many teachers who have low efficacy depend on reading from textbooks when teaching students. No effective teacher will be reading a textbook for his or her students while teaching. In support of this point, Czerniak in Azar (2010) posited that high efficacious teachers are found to be using inquiry and student centered teaching strategies. They are not using teacher directed strategies like lecture method and reading from the text. When you come across a teacher who comes to teach from the textbook in a class, that

teacher is not sure of his or her ability and, therefore, may score very low on efficacy scale. Yeh (2006) postulated that teachers' efficacy is a reliable predictor of the improvement of the personality characteristics of teachers. According to Bray-Clark and Bate teachers' efficacy is a strong self-regulatory characteristic that enables teachers to use their potentials to enhance students learning. Efficacy is informed by the teachers' understanding of what effective teaching is. Teachers' efficacy is an important motivational construct that shapes teacher effectiveness in the classroom.

Statement of the Problem

Mathematics at the secondary school level ought to be taught to generate students' interest, provide solid foundation for everyday living, development of computational skills, developing logical and abstract thinking and ability to recognize problems and solve them with related mathematical background and stimulate creativity potentials of the learners. This will however, require mathematics teachers who are proficient in classroom management, student's engagement and use of appropriate instructional strategies to achieve these noble goals.

In spite of this, evidence abounds of the regressional trend in the poor performance of students in Mathematics over a period of time especially in Senior Secondary Certificate Examination (SSCE) in Delta State of Nigeria. This has been a cause of concern, worry and a source of anxiety on the part of educators and parents whom have seen these students as the only hope for the future. For instance, the WAEC May/June 2018 as released out of the fifty three thousand, four hundred and twenty-three candidates who sat for the examination in Delta State only twenty seven thousand, seven hundred and twenty six (27,726) candidates representing fifty two percent (51.89%) obtained credits in Mathematics. It was noted that when this result is compared to the 2017 May/June results, there was a serious decline in the performance of candidates as 64.86% recorded in 2017. Regrettably, 46.53% was recorded in 2013, 39.10% in 2014, 47.58% in 2015 (Department of Examination and Standard, Ministry Of Basic and Secondary Education Delta State).

With the status of poor performance of secondary school students in Mathematics, one begins to wonder how we can produce enough learners who would be qualified to enroll at the tertiary institutions to pursue further studies, since Mathematics is a major requirement for admission into tertiary institutions and Mathematics has being a tool for national development, a vehicle through which doctors, engineers, accountants, mathematicians, scientists, teachers and other professionals are made. Many reasons have being adduced for this ugly trend of dismal performance of students in Mathematics in Delta state such as students attitudes to learning mathematics, lack of interest, inappropriate use of instructional materials just to mention but few. What is however not cleared to the researcher is the extent to which Mathematics teachers' efficacy with regards to instructional strategies, classroom management, student engagement, qualifications, experiences, age, gender and location of schools correlates students' academic achievement in Mathematics in secondary schools in Delta state. To this end, the researcher is worried if there are no well-trained Mathematics teachers in our schools?

The following research questions were raised to guide the study:

1. What is the relationship between Mathematics teachers' efficacy in instructional strategies and students'

achievement in senior secondary school Mathematics?

2. What is the relationship between Mathematics teachers' efficacy in classroom management and students' achievement in senior secondary school Mathematics?
3. What is the relationship between Mathematics teachers' efficacy in students' engagement and students' achievement in senior secondary school Mathematics?
4. What is the combined relationship among Mathematics teachers' efficacy in instructional strategies, students' engagement, classroom management and students' achievement in senior secondary school Mathematics.

Research Hypotheses

1. There is no significant relationship between Mathematics teachers' efficacy in instructional strategies and students' achievement in senior secondary school Mathematics.
2. There is no significant relationship between Mathematics teachers' efficacy in classroom management and students' achievement in senior secondary school Mathematics.
3. There is no significant relationship between Mathematics teachers' efficacy in students' engagement and students' achievement in senior secondary school Mathematics.
4. There is no significant relationship among Mathematics teachers' efficacy in instructional strategies, students' engagement, classroom management and students' achievement in senior secondary school Mathematics.

Purpose of the Study

This study was set out to investigate Mathematics teachers' efficacy as correlate of students' achievement in senior secondary school Mathematics in Delta state of Nigeria. It was aimed at the following objectives:

1. To investigate the relationship between Mathematics teachers' efficacy in instructional strategies and students' achievement in senior secondary school Mathematics.
2. To ascertain the relationship between Mathematics teachers' efficacy in classroom management and students' achievement in senior secondary school Mathematics.
3. To examine the relationship between Mathematics teachers' efficacy in student engagement and students' achievement in senior secondary school Mathematics.
4. To establish the combined relationship of Mathematics teachers' efficacy in instructional strategies, students' engagement, classroom management and students' achievement in senior secondary school Mathematics.

Methodology

This study adopted correlational research designed. A correlational research design measures two or more relevant variables and assesses the relationship between and among the variables, as well as allows the prediction of future events from the present available knowledge. This design is therefore suitable for the study because it is fundamentally meant to explain the extent to which Mathematics teachers' efficacy in instructional strategies, students' engagement and classroom management predict senior secondary school students' achievement in Mathematics in Delta state.

The population of the study covered all the Senior Secondary School 3 (SSS3) Mathematics students and all the Mathematics teachers teaching senior secondary schools in the 2 Local Government Area of Ughelli Education Zone in Delta State.

Simple random sampling was applied to selected 7 schools out of the entire population. A sample of 160 students and 20 Mathematics teachers were randomly selected from the schools in the 2 Local Government Areas of study.

The instruments for data collections are Mathematics teachers' Efficacy scale Questionnaire (MTSES) and Mathematics Achievement Test (MAT) were used to elicit information from the respondents. The instruments were validated by three experts from department of measurement and evaluation, mathematics and Curriculum studies whose correction and comments enhanced the final draft production. The test-retest method was used to determine the reliability coefficient. The coefficient total of 0.83 was obtained using cronback alpha method. The research questions using pearson product-moment correlation. Linear regression analysis was used to test hypotheses 1 – 3 while hypothesis 4 was tested using multiple regression analysis.

RESULTS

- There is no significant relationship between Mathematics teachers' efficacy in instructional strategies and students' achievement in senior secondary school Mathematics.

Table 1: Correlations between Mathematics teachers' efficacy in instructional strategies and students' achievement

Variable	N	R	Sig	Remarks
Instructional Strategies	180	-.191	.420	Not Significant
Student's Achievement				

P-Value is Significant at 0.05 level (2-tailed) Sources: Computed from Field Work, (2025)

Table 1 shows the relationship between Mathematics teachers' efficacy in instructional strategies and students' achievement. The Table shows that the correlation coefficient of -.191 is negatively very low and the r-value is not significant at p-value of 0.420, because it is greater than alpha value of 0.05. Therefore null hypothesis which states that there is no significant relationship between Mathematics teachers' efficacy in instructional strategies and students' achievement in senior secondary school Mathematics is therefore retained. Consequently, there is no significant relationship between Mathematics teachers' efficacy in instructional strategies and students' achievement in senior secondary school Mathematics.

- There is no significant relationship between Mathematics teachers' efficacy in classroom management and students' achievement in senior secondary school Mathematics.

Table 2: Correlations between Mathematics teachers' efficacy in classroom management and students' achievement

Variable	N	R	Sig	Remarks
Classroom Management	180	-.189	.426	Not Significant
Students' Achievement				

P-Value is not Significant at 0.05 level (2-tailed) Sources: Computed from Field Work, (2025)

Table 2 indicates the relationship between Mathematics teachers' efficacy in classroom management and students' achievement. The Table depict that the correlation coefficient of -.189 is negatively very low and the r-value is not significant at p-value of 0.426, because it is greater than alpha value of 0.05. Therefore null hypothesis which states that there is no significant relationship between Mathematics teachers' efficacy in classroom management and students' achievement in senior secondary school Mathematics is therefore retained. Consequently, there is no significant relationship between Mathematics teachers' efficacy in classroom management and students' achievement in senior secondary school Mathematics.

- There is no significant relationship between Mathematics teachers' efficacy in students' engagement and students' achievement in senior secondary school Mathematics.

Table 3: Correlations between Mathematics teachers' efficacy in students' engagement and students' achievement

Variable	N	R	Sig	Remarks
Students' Engagement	180	-.495	.026	Significant
Student's Achievement				

P-Value is Significant at 0.05 level (2-tailed) Sources: Computed from Field Work, (2025)

Table 3 shows the relationship between Mathematics teachers' efficacy in students' engagement and students' achievement. The Table shows that the correlation coefficient of -.495 is negatively moderate and the r-value is significant at p-value of 0.026, because it is less than alpha value of 0.05. Therefore null hypothesis which states that there is no significant relationship between Mathematics teachers' efficacy in instructional strategies and students' achievement in senior secondary school Mathematics is therefore rejected. Consequently, there is a significant relationship between Mathematics teachers' efficacy in instructional strategies and students' achievement in senior secondary school Mathematics.

- There is no significant relationship among Mathematics teachers' efficacy in instructional strategies, students'

engagement, classroom management and students' achievement in senior secondary school Mathematics.

The result for the analysis of this hypothesis is presented in Table 4 and 5.

Table 4: Summary of ANOVA on the multiple regression estimate Mathematics teachers' efficacy in instructional strategies, students' engagement, classroom management and students' achievement

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	430.681	3	143.560	1.855	.178
Residual	1238.119	16	77.382		
Total	1668.800	19			

Source: Field Study (2025)

The data analysis in Table 4 reveals that the ANOVA summary of multiple regression based on students achievement as predicted by the dimensions of Mathematics teachers' efficacy is statistically significant ($F(3, 16) = 1.855$, $p = .000 > .05$). Thus, the null hypothesis is retained. This means that there is no significant relationship among Mathematics teachers' efficacy in instructional strategies, students' engagement, classroom management and students' achievement in senior secondary school Mathematics

Table 5: Multiple regression coefficients on Mathematics teachers' efficacy predicting students' academic achievement

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	73.865	13.271		5.566	.000
Students Engagement	-3.000	1.525	-.468	-1.968	.067
Instructional Strategies	-.143	1.422	-.024	-.101	.921
Classroom Management	-.543	1.028	-.116	-.528	.605
a. Dependent Variable: Students' Achievement					

Note. R = .508; R-square = .258; Adjusted R-square = .119; $p > .005$

Source: Field Study (2025)

Table 5 confirms that none of the teachers efficacy dimensions predicting students' academic achievement were found to be significant – students' engagement, (p = .067), instructional strategies (p = .921), and classroom management (p = .605). The adjusted R square value is .119, which indicates that the 11.9% of the variance in students' achievement is explained by teachers' efficacy dimensions. This value is relatively a small effect. Though, the overall model analysis reveals that mathematics teachers' efficacy predict students achievement but students engagement have more predictive effect on students' academic achievement.

Discussion of Findings

The findings of hypothesis one revealed that there is no significant relationship between Mathematics teachers' efficacy in instructional strategies and students' achievement in senior secondary school Mathematics. This finding is not in agreement with that of Holzberger, Philipp, and Kunter (2013) who investigated the role of teachers' efficacy beliefs on their instructional quality analyzing the data, the researchers found a significant positive correlation between teachers' efficacy beliefs and their instructional quality. That is, the more efficacious the teachers are, the higher the students' perception of the quality of instruction. Also, Gibson and Dembo's (1984) found that there was a low but significant positive correlation between the pre-service teachers' personal teaching efficacy and their willingness to use each of the instructional strategies in the instrument.

The results of hypothesis two depicted there is no significant relationship between Mathematics teachers' efficacy in classroom management and students' achievement in senior secondary school m Mathematics. This finding supported that of Akiri (2013) who determined the effects of teachers' classroom effectiveness on student's academic performance in public secondary schools in Delta State, the results showed that effective teachers produced better performing students. However, the observed differences in students' performance were statistically not significant.

The data output of hypothesis three indicated that there is a significant relationship between Mathematics teachers' efficacy in students' engagement and students' achievement in senior secondary school Mathematics. This finding is positively related to that of Uden, Ritzen, and Pieters (2013) examined teachers' efficacy and perceived student engagement. They found that teachers with high levels of efficacy scored themselves as higher on influencing student engagement. Therefore, they found a positive correlation between students' engagement and students' achievement.

Hypothesis four findings showed that there is no significant relationship among Mathematics teachers' efficacy in instructional strategies, students' engagement, classroom management and students' achievement in senior secondary school Mathematics. This finding is at variance with that of Khan (2011) who observed a correlation between teachers' efficacy and secondary school students' achievement. Khan finds that there is a

positive relationship between teachers' efficacy and students' achievement.

Conclusion: Base on the findings of this study, the following conclusions are made:

1. There is no significant relationship between Mathematics teachers' efficacy in instructional strategies and students' achievement in senior secondary Mathematics in Ughelli Educational zone of Delta state.
2. There is no significant relationship between Mathematics teachers' efficacy in classroom management and students' achievement in senior secondary Mathematics in Ughelli Educational zone of Delta state.
3. There is a significant relationship between Mathematics teachers' efficacy in students' engagement and students' achievement in senior secondary Mathematics in Ughelli Educational zone of Delta state.
4. There is no significant relationship among Mathematics teachers' efficacy in instructional strategies, students' engagement, classroom management and students' achievement in senior secondary Mathematics in Ughelli Educational zone of Delta state.
5. Though the overall model analysis reveals that Mathematics teachers' efficacy predict students' achievement but students engagement have more predictive effect on students' academic achievement.

Recommendation: Base on the findings of this study, the following recommendations are made:

1. There is need to investigate the correlation between Mathematics teachers' efficacy in instructional strategies and students' achievement in senior secondary school Mathematics
2. There is need to ascertain the correlation between Mathematics teachers' efficacy in classroom management and students' achievement in senior secondary school Mathematics.
3. There is need to examine the correlation between Mathematics teachers' efficacy in student engagement and students' achievement in senior secondary school Mathematics.
4. A work of this nature should be carried out on Mathematics teachers in Delta State due to students' poor performance in WAEC.

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