

SECONDARY SCHOOL SCIENCE TEACHERS' SELF-EFFICACY AS CORRELATE OF STUDENTS' PERFORMANCE IN MINNA, NIGER STATE

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Abstract: *The study was conducted to determine the correlation between Secondary School Science Teachers' Self-Efficacy and Students' Performance in Minna, Niger State, Nigeria. Secondary school Science teachers and students used for this study are Biology, Chemistry, Physics and Mathematics teachers and students. The study was guided by one research question and also one corresponding hypothesis. Correlational research design was used for the study. A total of one hundred and twenty three (123) Science teachers and three hundred and eighty five (385) Science students made up the sample size of the study. Instrument used for data collection from Science teachers is a Likert type questionnaire designed by the researchers and titled "Questionnaire on Science Teachers' Self-Efficacy (QUSTSE)" The instrument was validated by experts and its reliability coefficient was also determined to be 0.74 using Cranach Alpha statistical tool. Data collected from Science teachers was correlated with SSIII Science students' Mock examination result conducted by Niger State Ministry of Education (NSMOE) during 2022/2023 academic session to establish a relationship. Mean, standard deviation and scattered plots were used to answer the research question while linear regression was used to test the hypothesis. Findings of the study revealed a positive relationship between Science teachers' Self-Efficacy and students' performance. Based on this finding, it was recommended that Science teachers' Self-Efficacy should be one of the major criteria to be considered by the government during recruitment of Science teachers. In addition, Government should intermittently expose Science teachers to training and retraining programs through seminars, conferences and workshops so as to improve their mastery of their respective subject areas as well as motivating them to develop high level of Self-Efficacy*

Keywords: *Examination, Mock, Performance, Science Students, Science Teachers, Secondary School and Self-Efficacy*

Introduction

Self-efficacy is seen and defined in many ways by many experts. For instance, Self-efficacy refers to one's perception, skill or ability to effectively and competently perform a specific task at a particular period of time. On the other hand, Self-efficacy is the belief that one is capable of exercising personal control over his or her behaviour, thinking and emotions. As a classroom teacher therefore, Self-efficacy refers to the teacher's perception, skill or ability to effectively and competently teach his or her subject. This implies that teacher's Self-efficacy is an effective way by which a teacher controls how, when and whether to act or not in a classroom instruction. Effective teachers believe that they can make a difference in children's lives and they teach in ways that demonstrate this belief. What teachers believe about their capability to teach in a classroom is a very strong determination of teacher effectiveness.

Self-efficacy according to Chiu and Klassen (2010a) is defined as one's beliefs about his or her ability to perform a specific behavior. This implies that Self-efficacy influences one's perception, skill as well as ability to be effective and competent in carrying out a specific task. A person's level of self-efficacy can affect both his or her initiative abilities as well as his or her persistence abilities while discharging a particular task. In this case, Science teachers' self-efficacy level can be used to predict his or her ability to effectively implement Science curriculum and how long such a teacher will persist at the implementation of Science curriculum right from the beginning of the curriculum implementation processes to the end. This implies that self-efficacy enables us to be future oriented experts in our capabilities to initiate, organize and execute a particular task. It has therefore become clear that for Science students to perform very well, Science teachers must possess the required skills (self-efficacy) to teach effectively. In addition, Chiu and Klassen (2010a) opined that

accomplishing a particular scientific task. In other word it implies that, Science teachers' self-efficacy is the teachers' personal believe in his or her ability to plan and execute instructional objectives successfully so as to enhance students' performance. Science teachers Self-efficacy is simply seen as the teachers' confidence and capability in implementing the Science curriculum effectively and successfully hence, improving students' performance.

However, Shopelu *et al.* (2021) posits that teachers' self-efficacy is not the same as teachers' competency in relation to classroom instruction. The reason is because teachers' competency is all about teachers' professional knowledge and skill about his specific subject area while teachers' self-efficacy on the other hand, is all about teachers' capability to put his professional knowledge and skill into action during classroom instruction. Teachers' high level of self-efficacy enables him to use his professional knowledge and skill to bring about effective classroom instruction. This is normally expected to bring about improvement in students' performance. Implicitly, teachers' low self-efficacy inhibits his ability to use professional knowledge and skill effectively with significant hindrance on students' performance. Shopelu *et al.* (2021) further asserted that a highly positive Self-efficacy quality of teachers enables them to use their potentials to enhance students' comprehension and a corresponding better performance. This is a clear advantage of high level of teacher self-efficacy. Teachers' self-efficacy ability is expected to be well acknowledged and motivated so as to bring about a corresponding teachers' perseverance and students' better performance. This is because the stronger the teachers' self-efficacy, the stronger the classroom instruction and also, the stronger the students' performance.

In addition, Peter *et al.* (2019) believes that, Self-efficacy predisposes an individual to action that has some degree of consistency and can be evaluated as either negative or positive. By implication, Science students' performance can either be positively or negatively influenced by Science teachers' self-efficacy during classroom instruction. Teacher's high degree of consistency results to teacher's high degree of teaching experience which in turn results to teacher's ability to form a strong self-efficacy. This in turn, can influence students' performances in classroom. Peter *et al.* further posits that, Science teachers' self-efficacy may sometimes be at variance with the main objectives and teaching methods recommended for Science teaching but, teachers with high self-efficacy can still successfully achieve the stated objectives. This study therefore intends to investigate further to confirm the findings of the above researchers on the relationship between Science teachers' self-efficacy and students' performance.

Statement of the Problem

It is no longer news that Science subjects perform interdisciplinary functions mainly for the satisfaction of man. Knowledge of Science is of paramount importance especially on the growth and development of an individual as well as the nation. Because of the importance of the knowledge of Sciences generally, it is now a policy in Nigeria that, no candidate can be offered admission into any higher institution of learning for science related courses without a credit pass in all science subjects. This is one of the reasons why all Science subjects are made core and compulsory subjects at both primary and secondary schools in Nigeria. This interdisciplinary role of Sciences has made Nigeria government to attach much importance to Science subjects as clearly emphasized in the national policy on education which is an educational document produced by Federal Republic of Nigeria (FRN, 2014). Unfortunately, it is disheartening to observe that despite the importance attached to the study of Science subjects by government and education stakeholders, students still records low performance in Sciences especially at SSCE level (Gaudence *et al.*, 2013). The issue of students' low or poor performance in Science has become so worrisome to many individuals, researchers, government, as well as many organizations. In an attempt to address this challenge, a number of research studies have been conducted and researchers have identified among other factors that could be responsible for students' poor performance in Science subjects to include Science teachers' self-efficacy.

In addition, teaching and learning of Science subjects has in most cases been through lecture or conventional method. This method is mostly employed by Secondary School Science teacher that lack the needed self-efficacy in teaching their various teaching subjects. Unfortunately, lecture or conventional method used by such teachers always subjects the students to memorization and rote learning of the scientific concepts. This makes teaching and learning of scientific concepts to be very difficult to comprehend, abstract and uninteresting to the students. This therefore implies that, despite the widespread availability of various teaching strategies at various educational levels and Government efforts to improve classroom instruction in Nigeria, most Secondary School Science teachers do not sufficient self-efficacy. This is one of the major causes of mass failure or underperformance of science students especially at Senior School Certificate Examination (SSCE) level. As a step towards addressing this persistent challenge, this study was designed to correlate Science teachers' self-efficacy and Science students' performance in Minna, Niger State. Findings of this study would at the end be used as contribution to the existing knowledge on the correlation or relationship between Science teachers' self-efficacy and Science students' poor performance in Minna, Niger State.

Purpose of the Study

1. Relationship between Secondary School Science teachers' self-efficacy and students' performance in Minna, Niger State

Research Question

1. What is the relationship between Secondary School Science teachers' self-efficacy and students' performance in Minna, Niger State?

Hypothesis

The following null hypothesis was formulated and tested at 0.05 significant level

- H_{01} There is no significant relationship between Secondary School Science teachers' self-efficacy and students' performance in Minna, Niger State

Literature Review

Many research studies have been conducted and many divergent findings have been reported on Science teachers' self-efficacy and students' performance. For instance, Shopelu *et al* (2021) cited the work of Skaalvik *et al.* (2015) which was conducted on the assessment of the impact of teacher support and self-efficacy on students' grades in mathematics and mathematics motivation. Eight hundred and twenty three (823) middle school students in Norway were used for the study and analysis was done using multiple regression and SEM analysis. Motivational indicators examined were intrinsic motivation, persistence, effort and help seeking behavior. The findings revealed that there is a relation among students' grades and their motivation were partly mediated through teachers' self-efficacy and emotional support.

On the other hand, Machebe *et al.* (2017) reviewed the research work of Adedeji in Temitope and Olabanji (2015) who examined the relationship between Teacher self- efficacy, interest, attitude, qualification, experience and pupils' academic achievement in primary school mathematics. The participants of the study comprises of 254 primary school teachers and 120 primary school pupils. Data collected on the study were analysed using a stepwise multiple regression analysis. The results reveal that teacher self-efficacy and interest had significant correlation with pupils' achievement scores. Teacher's self-efficacy being the best predictor of pupils' academic achievement in mathematics was followed by teachers' interest. Attitude, qualification and experience were not significant correlation with pupil's achievement in mathematics. The study recommended that primary school educational authorities should design educational programmes that will enhance the teacher self- efficacy for a better prediction of pupils' achievement.

Additionally, Mullis *et al.* (2016) conducted a research study on the relationship between teachers' self-concept and socioeconomic status, the number of books at home and possessing a computer. A survey research design was used for the study. The outcome indicated that in both 1999 and 2011, the self-concept was by far the strongest forecaster of academic achievement. It had a higher

In the final model for TIMSS 2011, the study that, students' self-concept concealed completely the outcome of the significance of academic achievement.

Keller *et al.* (2014) worked on the relationship between students' motivation and teacher enthusiasm (self-efficacy). Participants in the study were 75 Secondary school teachers and 863 students. The scale was used to measure enjoyment and constructive experiences associated to teaching. A correlational study design Multilevel Structural Equation Modeling revealed the enthusiasm of teachers had significant effect on their students interest in the subject taught. In addition, the measurement model in which positive affect and positive emotional expressivity defined the dispositional enthusiasm of the teachers was sound. The convergent validation exhibited a strong positive relationship to the students' views of teacher enthusiasm. The reliabilities of the First enthusiasm scale was 0.76 while that of the second scale was $\alpha = 0.83$ and was just slightly positively skewed. The results supported the expectations of the measurement model for the construct and showed that dispositional teacher enthusiasm or teachers with self-efficacy had positive effect on students' interest, as seen in their satisfaction and intrinsic worth. This could be because enthusiastic teachers (teachers with self-efficacy) aid their students in having positive subject-related emotional experiences and give them sense of a personal significance of the subject area. The findings showed that dispositional teacher enthusiasm (teachers with self-efficacy) positively predicted students' interest.

Furthermore, Aslan *et al.* (2013) examined the relationship between Teacher factors and pupils' academic achievement in primary school mathematics. The participants of the study consist of 254 primary school teachers and 120 pupils. Data collected on the study were analyzed using as stepwise multiple regression analysis. The results reveal that teacher self-efficacy and interest which were among the teachers' factors considered in the study had significant correlation with pupils' achievement scores. Teacher's self-efficacy was the best predictor of pupils' academic achievement in mathematics followed by teachers' interest. The other factors like attitude, qualification and experience were not significantly correlated to pupil's achievement.

Methodology

This research study employed the use of correlational research design, where Senior Secondary three (SS III) Science students' Mock examination result conducted by Niger State Ministry of Education NSMOE during 2022/2023 academic session was correlated with the data collected on the Science teachers' teaching experience to establish a relationship. Science teachers and students used for this study are Biology, Chemistry Physic and Mathematics teachers and students. Total target population for this study comprises of three hundred and seventy five (375) Science teachers and one thousand, seven hundred and nineteen (1,719) students respectively in Minna, Niger State during 2022/2023 academic session. Simple random sampling technique was employed for this study and a total of six (6) public secondary schools in Minna were randomly selected and used for the study. The study used all the Science teachers teaching in all the selected schools and all the SS III Science students of the same selected schools that sat for Mock examination conducted by NSMOE (during 2022/2023 academic session).

To obtain the Science teachers' sample size, all the one hundred and twenty three (123) Science teachers (71 males and 52 females) from the six (6) sampled schools were used. In addition, all the three hundred and eighty five (385) Science students that sat for the promotion examination (in 2022/2023 academic session) in all the six sampled schools formed the sample size of the students. SSIII students' promotion examination result was used because it was conducted by Niger State Ministry of Education (NSMOE) hence, it is already a standardized examination result. The already an existing promotion examination result of all the three hundred and eighty five (385) SS III students was used (ex-post facto). By implication, the Science students' promotion examination result was compared with Science teachers' response on teaching experience questionnaire to establish the relationship between Science teachers' teaching experience and students' performance

Research instrument used for this study is a Likert type questionnaire designed by the researchers for the purpose of this study. The questionnaire was titled "Questionnaire on Science Teachers' Self-Efficacy (QUSTSE)" The questionnaire was validated by three (3) experts in the areas of Science Education as well as Test and Measurement. The experts made some corrections, suggestions and observation about the instrument which were used by the researcher to produce the final copy of this instrument.

A pilot test was carried out to determine the reliability of the instrument using 20 Science teachers. The data collected was splitted into two equal halve to produce two sets of data used for analysis using SPSS 23 software. Cranach's Alpha statistical tool used and reliability coefficient of 0.74 was obtained. During data collection, the researcher visited the authorities of the sampled schools to seek for permission to use their schools for research study. Permission was granted and the researchers were introduced to staff and specifically, the Science teachers. The researcher then gave an orientation to the Science teachers, selected the research assistants and thereafter, trained the research assistants about the research study. Mean, standard deviation and scattered plots were used to answer the research question while linear regression was used to test the hypothesis.

Results

Research Question

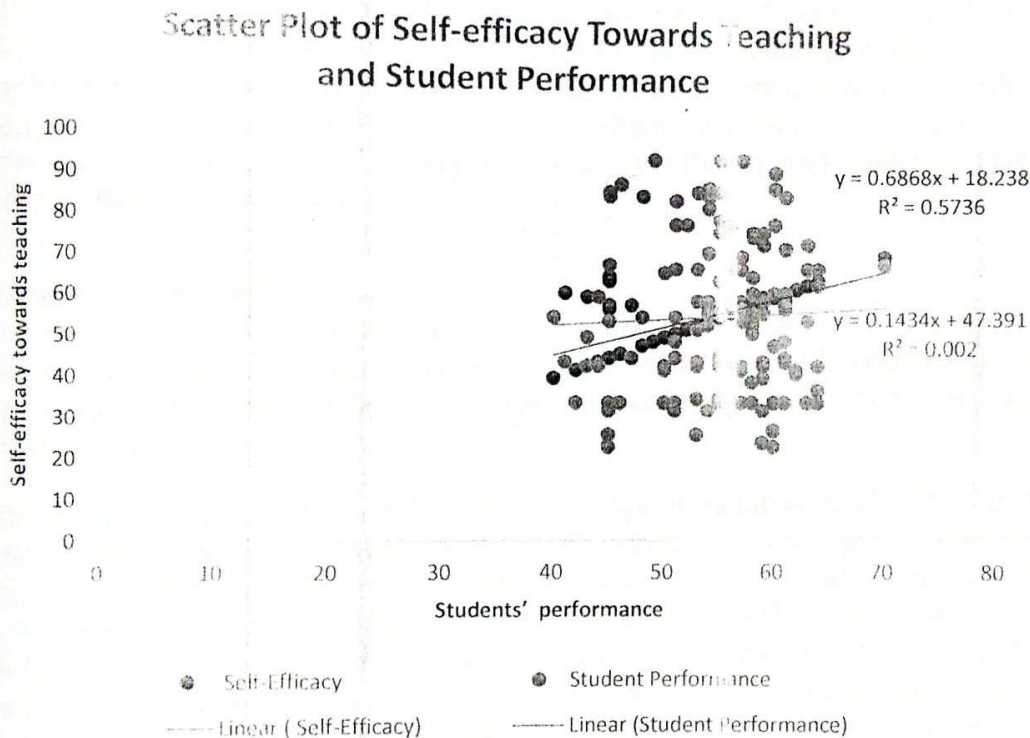


Figure 4.10: Scattered Plot of the Relationship between Science teachers' self-efficacy towards teaching and students' performance

Figure 1 is a scattered plot of the relationship between Science teachers' self-efficacy towards teaching and students' performance. The scattered plot indicates that there seem to be a relationship between Science teachers' self-efficacy and students' performance.

Table 1a: Linear Regression Model Summary on the Relationship Science Teachers' Self-efficacy towards Teaching and Students' Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.358 ^a	.128	.124	12.816

Predator (Constant): Science Teachers' Self-efficacy towards Teaching

Table 1a shows linear regression model summary of the independent variable (Predator) which is Science teachers' self-efficacy towards teaching and the dependent variable (Criterion) which is students' performance. The result shows the calculated $r(1,140) = 0.358$, $r^2 = 0.128$. The r^2 value of 0.128 indicated that 12.8% of the variance in students' performance is accounted by Science Teachers' Self-efficacy. To determine whether there is a significant relationship between Science Teachers' self-efficacy and students' performance, regression coefficient is presented in Table 1b.

Table 1b. Regression Coefficient of Science teachers' self-efficacy towards teaching and students' performance

Variable	Unstandardized Coefficients	Standardized Coefficients	t	Sig
	B	Std. Error	Beta	
(Constant) Science self-efficacy	91.198	56.317		1.588 0.187
	0.358	0.656	0.269	0.568 0.532

Dependent variable: Students' Performance

Table 1b shows the regression coefficient of Science teachers' self-efficacy towards teaching and students' performance. The result reveals that there is a significant relationship between Science teachers' self-efficacy towards teaching and students' performance ($B = 0.358$, $t = 0.568$, $P(0.532) > 0.05$). The regression coefficient indicates that for any increase in one unit of Science teachers' self-efficacy towards teaching will predict an increase in 0.358 units of students' performance when all other factors or variables remain constant in this particular population used for the study. This implies that, increase in Science teachers' self-efficacy towards teaching will result in increase in students' performance hence, this hypothesis which states that, 'There is no significant relationship between Secondary School Science teachers' self-efficacy and students' performance in Minna, Niger State.' is not accepted.

Discussion of Findings

The result revealed that there seems to be a relationship between Science teachers' self-efficacy towards teaching and students' performance. The findings on hypothesis showed that there was a significant relationship between Science teachers' self-efficacy towards teaching and students' performance.

The findings of the study is in line with findings of Skaalvik *et al.* (2015) in Shopelu *et al* (2021) whose result revealed that there is a relation among students' grades and their motivation were partly mediated through teachers' self-efficacy and emotional support. Finding of this study corroborate the findings of Keller *et al.* (2014) who worked on the relationship between students' motivation and teacher enthusiasm. They found showed that dispositional teacher enthusiasm (self-efficacy) has positive effect on students' interest, as seen in their satisfaction and intrinsic worth. This could be because enthusiastic teachers (teachers with self-efficacy) aid their students in having positive subject-related emotional experiences and give them sense of a personal significance of the subject area. Also another study conducted by Skaalvik *et al.* (2015), they assessed the impact of teacher support and student self-efficacy on students' grades in mathematics and mathematics motivation. The study corroborated by revealing that the relation among students' grades and their motivation were partly mediated through self-efficacy.

Conclusion and recommendations

From the finding of this study, it was concluded that there was a significant relationship between Science teachers' self-efficacy towards teaching and students' performance

It is therefore recommended that Science teachers' Self-Efficacy should be one of the major criterions to be considered by the government during recruitment of Science teachers. Government should motivate the teachers by paying them their remunerations and salaries promptly, provision

award of prizes, scholarships, so that the Science teachers will be motivated to develop high level of self-efficacy towards teaching so as to improve the student performance.

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