TEACHERS' SELF-REGULATION AND SOCIABILITY AS PREDICTORS OF STUDENTS' ACADEMIC ACHIEVEMENT IN BEARING AND DISTANCES

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Abstract

The study investigated the teachers' self-regulation and sociability as predictors of students' academic achievement in bearing and distances concept of mathematics**.** The design of the study was a correlational survey. The population of the study was two thousand and fifty-six (2056) respondents. The sample for the study consists of 384 respondents which comprise 48 SSII mathematics teachers and 336 students. The sample size was drawn using a multi-stage sampling procedure. Three instruments titled "Teachers' Self-regulatory Scale (TSRS)", "Teachers' Sociability Scale (TSS)" and "Bearing and Distances Achievement Test (BDAT) were used to collect data for the study. The data collected were analysed using regression analysis. The findings of the study revealed that 17% of students' academic achievement in bearing and distances was predicted by teachers' self-regulation. Similarly, 37% of students' academic achievement in bearing and distances was predicted by teachers' sociability. It was recommended that opportunities should be provided by teachers for students to share strengths and weaknesses as this, in turn, increases students' active participation in the classroom and hence their achievement.

Keywords: Teachers' self-regulation, Teachers' sociability, Students' achievement, Mathematics

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INTRODUCTION

The development of mathematics stems from humanity's continuous quest to count, measure, calculate, and predict events using reasoning. The importance of mathematical knowledge is paramount for success in various aspects of daily life, as emphasized by Okigbo (2012), who also highlighted its significance for a nation's social, economic, and technological progress. Due to its widespread application in science and technology, mathematics is considered a crucial subject in schools, shaping various fields of human endeavor. Success in mathematics is known to positively impact a student's overall academic performance and the quality of their educational certification, as noted by Ugwuanyi (2015) and Obiweluozo (2014). This led to the inclusion of mathematics as a core subject in both primary and secondary school curricula, following the National Policy on Education (Federal Republic of Nigeria, 2013).

Despite its importance, students' achievement in mathematics has been disappointing, as evidenced by reports from the West African Examination Council (WAEC) from 2016 to 2020 (Saad et al., 2014; Zakariya, 2016; Zalmon & Wonu, 2017). Among the topics posing difficulties for students, bearing and distances emerged as a consistent area of weakness. This topic, involving applied knowledge of trigonometry, is vital in various fields like surveying, geology, oceanography, and aerospace, underscoring the need for better training of secondary school mathematics teachers to improve teaching and learning outcomes (Praczyk, 2007).

Many secondary school students struggle with constructing, testing, and drawing shapes due to teaching methods that prioritize rote memorization over critical thinking and reasoning skills (Mereku, 2010). The WAEC chief examiner's report also revealed that students tend to avoid bearing and distances questions when given other alternatives, and those attempting these questions often demonstrate a lack of understanding in the subject matter (Fletcher & Anderson, 2012). Nonetheless, a solid foundation in bearing and distances can enhance a student's comprehension of other mathematical topics (Azuka, Jekayinfa, Durojaiye & Okwuoza, 2013).

Teachers play a crucial role in students' education and learning, with strong teacher-student relationships being key to successful teaching and academic performance (Paschal & Mkulu, 2021). Teachers' self-regulation and sociability are significant attributes that impact students' academic achievement (Aultman, Williams-Jonson, & Schutz, 2009). Self-regulation involves a teacher's ability to control their reactions to emotions and circumstances, while sociability refers to effective communication and interaction between teachers and students, building essential character traits.

Previous studies have supported the importance of self-regulation and sociability in students' academic achievement (Achufusi-Aka & Offiah, 2010; Greenberg & Costigan, 2017; Gustavsen, 2017; Ekuri & Offiah, 2018; Shing & Rustam, 2020; Santos, 2020). However, little empirical literature exists on these variables concerning students' achievement in bearing and distances. Given students' weaknesses in this aspect of mathematics, as indicated by the WAEC Chief Examiner's report, understanding the predictive powers of teachers' self-regulation and sociability in this area becomes essential. Thus, the present study aims to investigate the role of teachers' self-regulation and sociability as predictors of students' academic achievement in bearing and distances.

Purpose of the Study

This study investigated the teachers' self-regulation and sociability as predictors of students' academic achievement in bearing and distances.

Research Questions

The following research questions guided the study:

1. What is the predictive power of teachers' self-regulation on students' academic achievement in bearing and distances?
2. What is the predictive power of teachers' sociability on students' academic achievement in bearing and distances?

Hypotheses

The following null hypotheses guided the study and were tested at 0.05 level of significance.

Ho_1: The predictive power of teachers' self-regulation on students' academic achievement in bearing and distances is not significant.

Ho_2: The predictive power of teachers' sociability on students' academic achievement in bearing and distances is not significant.

METHODS

Research Design

A correlational survey research design was adopted for this study. Correlational reseach design according to Nworgu (2015) is one that tries to identify the relationship that exists between two or more variables. The choice of the design is because the researchers determined the degree to which teachers' self-regulation and sociability predict students' achievement in mathematics. In similar studies, Ezema et al. (2019), Gana et al. (2019), Okenyi et al. (2019), Ugwuanyi, Okeke and Njeze (2020); Ugwuanyi, Okeke and Ageda (2020); Ugwuanyi, Okeke and Asomugha (2020), Achagh et al. (2020), Ugwuanyi et al. (2020) and Okenyi et al. (2021), Orji et al. (2023) have used this kind of design.

Participants

The population of the study was two thousand and fifty-six (2056). This comprises of fifty-five (55) mathematics teachers and two thousand and one (2001) Senior Secondary II (SS2) students in Aguata Education zone of Anambra state. The sample for the study consists of 384 respondents which comprise 48 SSII mathematics teachers and 336 students. The sample size was drawn using a multi-stage sampling technique.

Instrument for Data Collection

Three instruments were employed for data collection in this study. They are "Teachers' Self-regulatory Scale (TSRS)", "Teachers' Sociability Scale (TSS)" and "Bearing and Distance Test (BDT)". The Teachers' Self-regulatory Scale (TSRS) sought information on Teachers' Self-regulatory abilities. The Teachers' Sociability Scale (TSS) sought information on the teachers' sociability. Both TSRS and TSS containseight (8) items each rated on a four-point Likert-styled scale. The ratings for the items ranged from 1-4 depicting Strongly Disagree,Disagree, Agreeand Strongly Agree respectively. The Bearing and Distance Test (BDT) consists of 20 multiple choice questions with four (4) response options for each item. This was used to collect data on Senior Secondary Two (SSII) students' academic achievement in bearing and distances. The test was developed using a test blueprint.

Validity and Reliability of the instrument.

The Teachers' Self-regulatory Scale (TSRS), Teachers' Sociability Scale (TSS) and Bearing and Distance Test (BDT) were face validated by three (3) experts; one in mathematics unit, one in measurement and evaluation unit both in the Department of Science Education, and one in educational psychology in the Department of Educational Foundations, all in the Faculty of Education, University of Nigeria, Nsukka. The Teachers' Self-regulatory Scale (TSRS) and Teachers' Sociability Scale (TSS) were further subjected to construct validation. The Bearing and Distance Achievement Test (BDAT) was also subjected to content validation. The internal consistency reliability was established for the TSRS and TSS using the Cronbach Alpha technique and KR-20 method for the BDAT. This gave a reliability coefficient of 0.84, 0.77 and 0.85 for TSRS, TSS and BDT respectively.

Data Collection

The researchers administered the TSRS and TSS directly to the teachers. Also,BDAT was administered to the students to collect data on their academic achievement. All the instruments were administered and collected on the spot. The researcher also sought the help of three (3) research assistants who were briefed on the modalities of administration and collection of instruments.

Data Analysis

The data collected were analyzed using SPSS version 21 which gave the regression analysis (correlation "r") and regression ANOVA F-statistics. The "r" obtained was used to answer all the research questions. However, the F-statistic obtained was used to test the hypotheses at 0.05 level of significance.

RESULTS

Table 1: Regression Analysis of the Predictive Power of teachers' Self-Regulation on Students' Academic Achievement in bearing and distances

Variable	N	r	r^2
Self-regulation	48		
		0.41	0.17
Academic Achievement	48		

KEY: *N = Number of respondents, r = Correlation coefficient, r^2 = Coefficient of determination*

The result of the study as presented in Table 1 shows the predictive power of teachers' self-regulation on students' academic achievement in bearing and distances. The result showed that a correlation coefficient (r) of 0.41 with associated coefficient of determination (r^2) of 0.17 were obtained from the correlation between teachers' self-regulation and students' academic achievement in bearing and distances. This result indicates that there was a positive medium relationship (r=0.41) between teachers' self-regulation and students' academic achievement in bearing and distances. Furthermore, the coefficient of determination (r^2) of 0.17 implies that 17% of students' academic achievement in bearing and distances is predicted by teachers' self-regulation. This is to say that 83% of students' academic achievement in bearing and distances is predicted by other variables other than the teachers' self-regulation.

Table 2: ANOVA F-test of the predictive power of teachers' self-regulation on students' academic achievement in bearing and distances

Model	Sum of Squares	Df	Mean Square	F	Sig.	Dec.
Regression	17.945	1	17.945	9.117	.004	S
Residual	90.541	46	1.968			
Total	108.486	47				

$\alpha = 0.05$ (Level of significance), S = Significant

In testing hypothesis one (Ho_1), F-test was used to test for the significance in the predictive power of teachers' self-regulation on students' academic achievement in bearing and distances. Result in Table 2 shows that an F-ratio of 9.117 with associated exact probability value of 0.004 was obtained. This exact probability value of 0.004 is less than 0.05 level of significance set as benchmark for testing the hypothesis and the result was found to be significant. The null hypothesis which stated that the predictive power of teachers' self-regulation on students' academic achievement in bearing and is not significant is therefore rejected. Inference drawn was that, teachers' self-regulation has a significant ($p<0.05$) predictive power on students' academic achievement in bearing and distances.

Table 3: Regression Analysis of the Predictive Power of teachers' Sociability on Students' Academic Achievement in Bearing and distances

Variable	N	r	r^2
Sociability	48		
		0.61	0.37
Academic Achievement	48		

KEY: *N = Number of respondents, r = Correlation coefficient, r^2 = Coefficient of determination.*

The result of the study as presented in Table 3 shows the predictive power of teachers' sociability on students' academic achievement in bearing and distances. The result showed that a correlation coefficient (r) of 0.61 with associated coefficient of determination (r^2) of 0.37 were obtained from the correlation between teachers' sociability and students' academic achievement in bearing and distances. This result indicates that there was a positive high relationship (r=0.61) between teachers' sociability and students' academic achievement in bearing and distances. Furthermore, the coefficient of determination (r^2) of 0.37 implies that 37% of students' academic achievement in bearing and distances is predicted by teachers' sociability. This implies that 63% of students' academic achievement in bearing and distances is predicted by other variables other than the teachers' sociability.

Table 4: ANOVA F-test of the predictive power of teachers' sociability on students' academic achievement in bearing and distances

Model	Sum of Squares	df	Mean Square	F	Sig.	Dec.
Regression	40.538	1	40.538	27.444	.000	S
Residual	67.948	46	1.477			
Total	108.486	47				

α = 0.05 (Level of significance), S = Significant

In testing hypothesis two (Ho_2), F-test was used to test for the significance in the predictive power of teachers' sociability on students' academic achievement in bearing and distances. Result in Table 4 shows that an F-ratio of 27.444 with associated exact probability value of 0.000 was obtained. This exact probability value of 0.000 is less than 0.05 level of significance set as bench mark for testing the hypothesis and the result was found to be significant. The null hypothesis which stated that the predictive power of teachers' sociability on students' academic achievement in bearing and distances is not significant is therefore rejected. Inference drawn is that, teachers' sociability significantly ($p<0.05$) has predictive power on students' academic achievement in bearing and distances.

DISCUSSION

The study's results indicated that 17% of students' academic achievement in bearing and distances could be predicted by teachers' self-regulation. The first hypothesis test also demonstrated that teachers' self-regulation significantly influences students' academic performance in bearing and distances. These findings align with Ekuri and Offiah's (2018)

research, which identified self-regulatory attribute variables as significant predictors of academic performance in Mathematics. Additionally, the researchers revealed that self-regulatory attributes collectively and individually contribute to academic achievement in Mathematics. This study's results also support Achufusi-Aka and Offiah's (2010) findings that self-regulated learning significantly predicts students' academic achievement. Likewise, the study resonates with Shing and Rustam's (2020) report, which highlighted the significant influence of self-regulation on upper primary students' academic achievement in English during forethought and performance phases. Thus, it underscores the importance of self-regulation for teachers, enabling them to maintain maximum concentration in the classroom and effectively manage students' behavior.

Furthermore, the study found that 37% of students' academic achievement in bearing and distances can be predicted by teachers' sociability. The second hypothesis test also revealed that teachers' sociability significantly impacts students' academic performance in bearing and distances. This result aligns with Gustavsen's (2017) findings, which showed that teacher-rated sociability is a significant predictor of boys' and girls' academic achievement. Similarly, Santos (2020) discovered a significant effect of social interaction on the academic performance of adult learners, indicating that social interactions also predict adult learners' performance. Being sociable helps teachers make informed decisions, good choices, and appropriately handle various classroom situations.

CONCLUSION

The findings of the study showed the predictive power (17%) of teachers' self-regulation on students' academic achievement in bearing and distances. This implies that teachers' self-regulation has a significant predictive power on students' academic achievement in bearing and distances. The findings of this study also revealed that 37% of students' academic achievement in bearing and distances is predicted by teachers' sociability. This implies that teachers' sociability significantly has predictive power on students' academic achievement in bearing and distances. Therefore, with self-regulation, teachers have the ability to inhibit first responses, to resist interference from irrelevant stimulation, and to persist on relevant tasks. Sociability on the other hand helps the teacher to have a good rapport with the students.

RECOMMENDATIONS

1. The teachers' sociability has been found to be a significant predictor of students' academic achievement in bearing and distances. Therefore, teachers should provide opportunities for students to share strengths and weaknesses as this in turn increases students' active participation in the classroom and hence higher achievement.
2. Mathematics teachers ought to be encouraged and assisted to help their students acquire self-regulation learning abilities so that they can assess , understand, anticipate,and control their own learning.
3. Future researchers and other stakeholders should take cognizance of the greater percentage predicted by other variables not included in the study so as to further improve the students' academic achievement.

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