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EFFECT OF SELF-EFFICACY ON MATHEMATICS STUDENTS' ACHIEVEMENT AND GOAL ORIENTATION IN SENIOR SECONDARY SCHOOLS IN EDUCATION DISTRICT IV, LAGOS STATE

BY

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Abstract

This study investigated effect of self-efficacy on mathematics students' achievement and goal orientation in senior secondary schools in Education District IV, Lagos State. Five research questions and five research hypotheses guided this study. Quasi-experimental design was employed in this study. The sample size for the study was 60 participants, who were grouped into experimental and control groups of 30 participants each. These participants were selected from two senior secondary schools in the chosen Education District. Research instruments used for data collection were Mathematics Achievement Test (MAT) and Motivation Scale on Goal Orientation (MSGO). Data collected were analysed using independent t-test and Analysis of Variance (ANOVA) at 0.05 level of significance. The study found among others that self-efficacy has significant effect on students' academic achievement in mathematics in senior secondary schools; self-efficacy has significant effect on goal orientation among senior secondary schools Mathematics students; and significant difference exists in the academic achievement of Mathematics students exposed to self-efficacy and those in the control group. The study concluded that self-efficacy has significant effect on mathematics students' achievement and goal orientation in senior secondary schools. The study recommended among others that Mathematics teachers should use learner-centred instructional methods that promote mastery learning for students' better academic achievement; and school counsellors should encourage mathematics students to develop and adopt positive academic goals.

Keywords: Goal Orientation, Mathematics, Secondary school, Self-Efficacy and Students' achievement

Introduction

Mathematics is one of the core subjects offered in the Nigerian educational system, especially in the primary and secondary school levels. It and serves as a foundation for scientific, technological, and economic development in any country. Mathematics is compulsory at the primary and secondary school levels because of its importance in problem-solving, logical reasoning, and critical thinking. Despite its significance, the performance of students in Mathematics in senior secondary schools in Nigeria has remained unsatisfactory over the years, especially in external examinations such as the West African Senior School Certificate Examination (WASSCE) and the National Examination Council (NECO) examinations. Researchers and educators have therefore continued to investigate psychological and environmental factors that may influence students' achievement in Mathematics. One of such psychological variables is self-efficacy.

The concept of self-efficacy was developed by Albert Bandura in the Social Cognitive Theory. Self-efficacy can be considered as an individual's belief in his or her ability to perform a particular task successfully or achieve a desired outcome (Ndubuisi, 2023). According to Bandura, individuals who possess high self-efficacy tend to approach difficult tasks with confidence, persistence, and resilience, while those with low self-efficacy often avoid challenging tasks and easily give up when faced with obstacles. In the context of Mathematics education, mathematics self-efficacy refers to students' confidence in their ability to understand mathematical concepts, solve mathematical problems, and succeed in Mathematics-related tasks. This is an indication that self-efficacy may affect students' academic achievement and goal orientation in Mathematics.

Academic achievement measures how well a learner performs on a given task or completes assignments related to the content and objectives of his/her study (Adio & Odebunmi, 2025). It is a major measure of school effectiveness and educational standard in any educational institution. Academic achievement shows how well a

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learner or student is achieves certain goals in schools, like secondary schools. Studies conducted in recent years have consistently shown that self-efficacy is positively associated with students' academic achievement in Mathematics. For instance, Yang, Maeda, and Gentry (2024) found that mathematics self-efficacy significantly predicted students' mathematics achievement across different grade levels and contributed to narrowing achievement gaps among students.

In addition to academic achievement, self-efficacy may also influence students' goal orientation. Goal orientation refers to the reasons, purposes, or motivations that guide students' learning behaviours and academic engagement (Yang, 2023). Goal orientation is commonly classified into mastery goal orientation and performance goal orientation. Students with mastery goal orientation focus on learning, understanding, and improving competence, whereas students with performance goal orientation focus on demonstrating ability and outperforming others. Researchers such as Yang (2023) have reported that students with high self-efficacy are more likely to adopt mastery-oriented goals, persist longer in difficult tasks, and demonstrate better academic outcomes. This is an indication that goal orientation will play a significant role in the determination of how students approach Mathematics learning. Students who adopt mastery goals are more likely to engage deeply in learning activities, use effective learning strategies, and persist when faced with mathematical difficulties. Conversely, students with low self-efficacy may adopt avoidance behaviours, exhibit fear of failure, and show reduced interest in Mathematics. Research by Wang, Shih and Yang (2020) indicated that self-efficacy mediates the relationship between mathematics interest and mathematics achievement, thereby emphasizing the importance of students' beliefs about their capabilities.

In Nigeria, several factors such as poor teaching methods, inadequate instructional materials, mathematics anxiety, and negative attitudes toward Mathematics have been identified as contributors to poor achievement in Mathematics. However, psychological variables such as self-efficacy and goal orientation have not received sufficient attention, especially among senior secondary school students in Lagos State. Lagos State is one of the most educationally advanced states in Nigeria, yet many secondary school students still experience difficulties in Mathematics achievement. Understanding the influence of self-efficacy on students' achievement and goal orientation could therefore provide valuable insights for improving Mathematics education in the state. It is against this background that this paper investigated effect of self-efficacy on mathematics students' achievement and goal orientation in senior secondary schools in Education District IV, Lagos State.

Statement of the Problem

The importance of mathematics in enhancing science, technology, and national development in any country cannot underestimated. Despite this importance, many senior secondary school students seem to continue perform poorly in Mathematics in internal and external examinations. This persistent poor performance of students in Mathematics has become a major concern to educators, parents, and government authorities. The poor performance has been attributed to several factors such as inadequate teaching methods, poor learning environment, lack of instructional materials, mathematics anxiety, and negative attitudes toward the subject. However, recent studies suggest that psychological factors, especially self-efficacy, may significantly influence students' academic achievement and goal orientation in Mathematics. For instance, students who lack confidence in their mathematical abilities may avoid challenging tasks, exhibit low motivation, and develop negative learning behaviours, which may hinder their academic achievement in mathematics. On the other hand, students with high self-efficacy are more likely to adopt mastery-oriented goals, persist in difficult tasks, and achieve better academic outcomes. Although several studies have examined self-efficacy and academic achievement in different contexts, limited studies have specifically investigated the combined influence of self-efficacy on both achievement and goal orientation among senior secondary school Mathematics students in Lagos State, especially in Education District IV. This is the gap filled by this paper. Hence, this study investigated the effect of self-efficacy on mathematics students' achievement and goal orientation in senior secondary schools in Education District IV, Lagos State.

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Research Objectives

The main objective of this paper was to investigate the effect of self-efficacy on mathematics students' achievement and goal orientation in senior secondary schools in Education District IV, Lagos State. The specific objectives of this paper are to:

i. ascertain the effect self-efficacy on students' academic achievement in mathematics in senior secondary schools;
ii. examine the effect of self-efficacy on goal orientation among senior secondary schools Mathematics students;
iii. ascertain if gender difference exists in academic achievement among Mathematics students exposed to self-efficacy;
iv. examine the gender differentials in goal orientation among Mathematics students exposed to self-efficacy;
v. ascertain if significant difference exists in the academic achievement of Mathematics students exposed to self-efficacy and those in the control group.

Research Hypotheses

The following hypotheses were tested at 0.05 level of significance:

1. Self-efficacy has no significant effect on students' academic achievement in mathematics in senior secondary schools.
2. Self-efficacy has no significant effect on goal orientation among senior secondary schools Mathematics students.
3. There is no significant gender difference in the academic achievement among Mathematics students exposed to self-efficacy in senior secondary schools.
4. There is no significant gender difference in the goal orientation among Mathematics students exposed to self-efficacy in senior secondary schools.
5. There is no significant difference in the academic achievement of Mathematics students exposed to self-efficacy and those in the control group.

Methodology

This study was conducted in Lagos State. The state is located in South-West, Nigeria. Quasi experimental design was employed in the study. The population for the study 379 Senior Secondary (SS) 1 Mathematics students in the two randomly selected secondary schools in Education District IV, Lagos. A sample size of 60 Mathematics students was used for this study. Two senior secondary schools were randomly selected for this study. Simple random sampling technique was used for selection of thirty (30) SS1 Mathematics students in each of the two (2) selected senior secondary schools. The two instruments used for collection of data in this study were Mathematics Achievement Test (MAT) and Motivation Scale on Goal Orientation (MSGO). MAT contained 40 items, which were constructed by the researcher on topics like indices, logarithms, sets, approximations and algebraic expression. In the case of MSGO, the adapted version of Muthee & Immanuel (2009) scale of achievement motivation was used. The scale has 32 items in total where 18 items were positively worded and 14 are negatively worded. Items with positive and negative wording were arranged randomly in the final scale. The serial numbers of the items with positive wording are the following: 3, 4, 5, 6, 11, 13, 14, 16, 17, 20, 23, 24, 26, 28, 29, 30, 31 and 32. The serial number of items with negative wordings are: 1, 2, 7, 8, 9, 10, 12, 15, 18, 19, 21, 22, 25 and 27. The responses to the items were marked at a five point likert format. The points are Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. The scoring weights given to these responses were 5, 4, 3, 2 and 1 respectively for positively worded items and 1, 2, 3, 4 and 5 respectively for negatively worded items. This scoring scheme ensured that higher scores indicate higher levels of achievement motivation and lower scores indicate low levels of achievement motivation. The two instruments were subjected to both face and construct validity. Equally, the reliability coefficient of the two instruments was determined using Cronbach's Alpha reliability method. The reliability coefficients obtained were 0.81 and 0.78 for MAT and MSGO respectively. The treatment and administration of the instruments lasted for six (6) weeks. A baseline assessment (or pre-test) was conducted for all the SS1 Mathematics students

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in the two senior secondary schools. The researcher administered the pre- test using MAT and MSGO. There was one experiment group and one control group. The experimental group was exposed to the self-efficacy during teaching/instruction in this study; while the control group was not given any treatment. Each of the groups was taught for five (5) weeks. The classes met twice in a week for duration of 40minutes per lesson. In the sixth week after the experiment was completed, the researcher re-administered MAT and MSGO to all participants in both the experimental and control groups in order to gather the post-test data. The data collected were analysed using independent t-test and Analysis of Variance (ANOVA) at 0.05 level of significance.

Results

Hypothesis One: Self-efficacy has no significant effect on students' academic achievement in mathematics in senior secondary schools

Table 1: Effect of Self-efficacy has no significant effect on students' academic achievement in mathematics in senior secondary schools

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	154.067	1	154.067	10.603	.002
Within Groups	406.876	28	14.531		
Total	560.943	29			

Table 1 shows that the calculated f-value of 10.603 has a significant p-value of 0.002. This means that the value of "F" obtained is significant at 0.05 level, as the p-value (0.002) is less than 0.05. Based on these results, the null hypothesis which stated that "Self-efficacy has no significant effect on students' academic achievement in mathematics in senior secondary schools." is rejected. Hence, self-efficacy has significant effect on students' academic achievement in mathematics in senior secondary schools.

Hypothesis Two: Self-efficacy has no significant effect on goal orientation among senior secondary schools Mathematics students

Table 2: Effect of Self-efficacy on goal orientation among senior secondary schools Mathematics students

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	357.949	1	357.949	15.956	.000
Within Groups	628.152	28	22.434		
Total	986.101	29			

Table 2 shows that the calculated f-value of 15.956 has a significant p-value of 0.000. This means that the value of "F" obtained is significant at 0.05 level, as the p-value (0.000) is less than 0.05. Based on these results, the null hypothesis which stated that "Self-efficacy has no significant effect on goal orientation among senior secondary schools Mathematics students" is rejected. Hence, self-efficacy has significant effect on goal orientation among senior secondary schools Mathematics students.

Hypothesis Three: There is no significant gender difference in the academic achievement among Mathematics students exposed to self-efficacy in senior secondary schools

Table 3: Significant gender difference in the academic achievement among Mathematics students exposed to self-efficacy in senior secondary schools

Gender	N	$\bar{x}$	Standard Deviation	Df	t	Sig.
Male	14	31.79	5.55		1.352*	.101
Female	16	30.63	5.44	29		

* Not Significant

Table 3 reveals that the calculated "t" value of 1.352 is not significant since the returned p-value of 0.101 is greater than the criterion level of significance of 0.05. Hence, the null hypothesis which stated that "There is no significant gender difference in the academic achievement among Mathematics students exposed to self-

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efficacy in senior secondary schools" is accepted. Thus, no significant gender difference exits in the academic achievement among Mathematics students exposed to self-efficacy in senior secondary schools.

Hypothesis Four: There is no significant gender difference in the goal orientation among Mathematics students exposed to self-efficacy in senior secondary schools

Table 4: Significant gender difference in the goal orientation among Mathematics students exposed to self-efficacy in senior secondary schools

Gender	N	$\bar{x}$	Standard Deviation	df	t	Sig.
Male	14	116.57	14.11		1.352*	.011
Female	16	118.50	10.62	29		

* Not Significant

Table 4 shows that the t-test statistics calculated is 1.352 with a returned p-value of 0.011. The returned p-value of 0.011 is greater than the level of significance (0.05); i.e. $p > 0.05$, Based on these results, the null hypothesis which stated that "There is no significant gender difference in the goal orientation among Mathematics students exposed to self-efficacy in senior secondary schools" is accepted. Hence, no significant gender difference exits in the goal orientation among Mathematics students exposed to self-efficacy in senior secondary schools.

Hypothesis Five: There is no significant difference in the academic achievement of Mathematics students exposed to self-efficacy and those in the control group

Table 5: Significant difference in the academic achievement of Mathematics students exposed to self-efficacy and those in the control group

Groups	N	$\bar{x}$	Standard Deviation	df	t	Sig.
Experimental Group	30	30.63	5.51		26.300*	.000
Control Group	30	14.90	5.22	59		

* Significant

Table 5 shows that the t-test statistics calculated is 26.300 with a returned p-value of 0.000. The returned p-value of 0.000 is less than the level of significance (0.05); i.e. $p < 0.05$, Based on these results, the null hypothesis which stated that "There is no significant difference in the academic achievement of Mathematics students exposed to self-efficacy and those in the control group" is rejected. Hence, significant difference exists in the academic achievement of Mathematics students exposed to self-efficacy and those in the control group.

Discussion of the Findings

This study found that self-efficacy has significant effect on students' academic achievement in mathematics in senior secondary schools. This means that self-efficacy has significant effect on students' academic achievement in mathematics in senior secondary schools. This finding aligns with that of Ndubuisi (2023) who found that self-efficacy positively correlated with mathematics achievement among secondary school students in Abia State. Also, Yang, Maeda, and Gentry (2024) found that mathematics self-efficacy significantly predicted students' mathematics achievement across different grade levels and contributed to narrowing achievement gaps among students. Similarly, Asanre, Abiodun, Akinosi, and Xulu (2025) reported that self-efficacy had a significant positive relationship with students' mathematics achievement among senior secondary school students in Nigeria.

This paper revealed that self-efficacy has significant effect on goal orientation among senior secondary schools Mathematics students. This implies that the treatment (self-efficacy) significantly affected goal orientation among senior secondary schools Mathematics students. Corroborating this finding, Hogan (2016) found significant relationships between self-efficacy, mastery goal orientation, and academic success in Mathematics. Also, Wang et al. (2020) reported that self-efficacy mediates the relationship between mathematics interest and mathematics achievement. Similarly, Yang (2023) found that self-efficacy mediated mastery goals and mathematics achievement.

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This study established that there is no significant gender difference in the academic achievement among Mathematics students exposed to self-efficacy in senior secondary schools. This implies that male and female Mathematics students exposed to self-efficacy in senior secondary schools are not differed in their academic achievement. Supporting this finding, Yang (2023) found that self-efficacy mediated mastery goals among students irrespective of gender. Similarly, Yang et al. (2024) found that Mathematics self-efficacy significantly influenced achievement regardless of students' demographic backgrounds, suggesting that supportive educational environments can reduce gender disparities in Mathematics achievement.

This study also revealed that no significant gender difference exits in the goal orientation among Mathematics students exposed to self-efficacy in senior secondary schools. This means that male and female Mathematics students exposed to self-efficacy in senior secondary schools are not differed in their goal orientation. Supporting the finding of this study, Yang (2023) found that self-efficacy mediated mastery goals and mathematics achievement irrespective of gender. Also, Hidayatullah et al. (2024) revealed that mastery experiences significantly predicted students' mastery goal orientation and Mathematics self-efficacy. This implies that any student, be it a male or female, who experienced success in mathematical tasks developed stronger confidence and more positive learning goals.

This study established that significant difference exits in the academic achievement of Mathematics students exposed to self-efficacy and those in the control group. Specifically, the mathematics students exposed to self-efficacy performed better than those in the control group by average of 15.73 marks. This finding aligns with Akayuure and Akayuure (2024) who reported that students with high self-efficacy demonstrated stronger motivation and achieved better outcomes in Mathematics learning compared to students with low confidence levels or in the control group. Also, Shimizu (2025) found that mathematics self-efficacy positively influenced students' behavioural engagement and academic achievement better than the students in the control group or with low self-efficacy.

Conclusion

Self-efficacy is an important psychological factor which has the tendency to influence students' achievement and goal orientation in Mathematics. This is based on the fact that students who possess strong beliefs in their mathematical abilities are more likely to achieve better academic achievement and adopt positive learning goals. Consequently, it can be concluded based on the findings of this study that self-efficacy has significant effect on mathematics students' achievement and goal orientation in senior secondary schools in Education District IV, Lagos State.

Recommendations

The following recommendations are suggested based on the findings of this study:

1. Mathematics teachers should use learner-centred instructional methods that promote mastery learning for students' better academic achievement.
2. School counsellors should encourage mathematics students to develop and adopt positive academic goals. This will enhance the mathematics students' goal orientation in senior secondary schools.
3. The senior secondary school administrators should organise counselling programmes aimed at improving students' self-belief and motivation toward Mathematics for better academic achievement in the subject.
4. Mathematics teachers should encourage and support all students, irrespective of gender to belief in their abilities towards effective participation in Mathematics learning activities for better goal orientation.
5. Mathematics teachers should adopt teaching strategies such as self-efficacy that can improve students' confidence and participation in class activities for better academic achievement and goal orientation.

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