

SELF-EFFICACY AS CORRELATES OF SECONDARY STUDENTS' ACADEMIC ACHIEVEMENT IN MATHEMATICS IN OGIDI EDUCATION ZONE.

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Abstract

The study examined self-efficacy as correlates of students' academic achievement in Mathematics in Ogidi Education Zone of Anambra state. Two research questions guided the study while two hypotheses were tested at 0.05 alpha level. A correlational survey design was adopted. The population of the study comprised 2,840 senior secondary school senior secondary two (SS2) Mathematics students from Ogidi Education Zone of Anambra state. The sample size of this study consists of 1,420 SS2 students offering Mathematics and drawn from secondary schools in Ogidi education zone, using multi stage sampling procedure. The instruments are Mathematics self-efficacy Questionnaire (MSEQ) and average termly score of from teacher's grade book. The instrument used was validated by three experts, all from Nnamdi Azikiwe University, Awka. The reliability of the instruments was established using Cronbach alpha method. The reliability coefficients of MSEQ was found to be 0.85. The data were collected with the help of the research assistants who were Mathematics teachers. Pearson product moment correlation (r) and R^2 were used to answer the research questions and to test the hypotheses. While Hayas process was use to answer research question and test hypotheses that has gender as moderating variable. The finding revealed that the relationship between self-efficacy and students' academic achievement in Mathematics is moderately positive and not significant. Also the study found that the relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender is moderately positive and significant. It was recommended that teachers should help students build self-confidence in Mathematics through regular practice, clear examples, and step-by-step feedback. Finally, Guidance counselors and class teachers should monitor students who show low confidence and offer support early, since self-efficacy showed at least moderately positive result

Keywords: Gender moderation, Mathematics achievement Self-efficacy.

Science education has been recognized as an essential key which equips learners with intellectual capacity and problem-solving skills needed to address complex global and societal challenges. It is a fundamental aspect of teaching and learning aiming to equip students with essential process, manipulative and social skills in scientific inquiry, critical thinking, and problem-solving (Abumchukwu, Ezeanya & Achugbu (2023). Science education is the scholarly and practical discipline concerned with the teaching and assessment of science content, science process as well as nature of science (Obikezie, 2018). This foundational knowledge is crucial in fostering a deeper understanding of the natural world and the scientific principles that govern it. Science education plays a pivotal role in socioeconomic development, promoting critical thinking, problem-solving, and analytical skills. By driving innovation, entrepreneurship and technological

advancements, science education boosts economic growth and development (Abumchukwu et-al 2023).

According to Bello (2021), science education identifies natural phenomena appropriate to child interest and skills. Also, he went on to say that science education equips teachers, learners and the society with knowledge, skills, equipment and freedom to perform noble tasks useful for improving socioeconomic standards. It also encourages curiosity, creativity and prepares students for careers in science, technology, engineering, and mathematics (STEM). Considering the importance of science education to man and national development, the subject has been enshrined into the school curriculum and taught as basic subject such as Mathematics, chemistry, physics, geography and at the senior school level

Mathematics is a branch of science, which deals numbers and their operations. It involves calculations, computations, problem solving etc. It is exact, precise, systematic and a logical subject. Mathematics plays a significant role in the national Nigeria as well as in other nations of the world. Mathematics has been found to be the queen of science and for educational thought and general development also the bedrock of engineering and technological education (Okafor-Agbala and Okigbo 2021), it is very essential to the growth of many other disciplines. It is the foundation for national building, since the level of Mathematical skills and competences go a long way to determine the level of science and technology components of any nations, which is a basic requirement for its development.

Despite these efforts, it is sad to note that students' performance in Mathematics external examination is yet to improve to the expectancy of education stakeholders. In light of this, researchers in recent times has argued that to enhance students learning outcome in Mathematics, there is a need to reposition efforts on their personal variables As these factors to an extent influence their wellbeing and comprehension of Mathematics concepts. In concordance with the premise, the study seeks to investigate how self-efficacy associate with students' achievement in Mathematics.

Self- efficacy belief is seen as ones' belief that he/she is able to organize and apply plans in order to achieve a certain task. It is a student's "I can" or "I cannot. Unlike self-esteem, which reflects how students' feels about their worth or value, self-efficacy shows how confident a student

is about performing specific task (Munir, Shehu & Ogbeta, (2024). For examples, high self-efficacy in Mathematics does not necessary translate to high self-efficacy in spelling. Self-efficacy specific in the context of this study is one's confidence in his or her ability to successfully complete a Mathematic task or reach a Mathematics goal. This self-efficacy in Mathematics is believed by to have capabilities or play important role in student's academic achievements. Nwankwo (2024), is of the view that students' general belief about their academic capabilities plays important role in the achievement in Mathematics. Researchers like Bini and Idehen, (2023) also found that students self-efficacy in their mathematical ability (Mathematical self-efficacy) could significantly affect academic achievement and the persistence in the field of mathematics. Heckett and Betz in Soleymani and Rekabdar (2016), defined Mathematics self-efficacy as an assessment of a person(s) self confidence in his/her ability for successful Mathematics task performing or mathematics specific problem ability. It is also believed that the sense of self-efficacy stimulates a student to persevere in achieving certain objectives, even in the presence of obstacles, and leads him/ her to the strategic use of all the abilities (Mohamed 2020). Based on these researchers view, students' self-efficacy in their Mathematics ability plays important roles on problem solving ability and this can result in positive academic achievement

Academic achievement refers to learning outcomes that indicate how far a person has progressed in specific goals of activities in instructional settings, such as school, college, and university (Suleiman, 2023). According to Abumchukwu, (2019), academic achievement depicts how much students own their learning. It is a critical aspect of education, as it reflects a student's ability to acquire knowledge, skills, and values essential for future success. Although academic achievement remains a core indicator of students' educational progress, gender may exist as a key factor that shape students' academic experiences and outcomes.

Gender refers to the characteristics of women, men, girls and boys that are socially constructed (Paul and Dutt, 2023). It includes behavior, norms, and roles associated with being a woman, man, girl or boy, as well as their relationship with each other. Tertiary institutions and secondary schools consist of male and female students with academic challenges peculiar to them, which demand that, they must have some level of self confidence in order to excel academically. Researchers like Mohamed suggests that male and female students may differ in how they perceive, express, and regulate emotions, which are key components of emotional intelligence. However, some research

reported that there is no gender difference influencing emotional intelligence and academic achievement (Obialor, 2024; Oriaku *et al.*, 2020).

Recber, Isiksal & Koc (2017), conducted a study on investigating self-efficacy, anxiety, attitudes and Mathematics achievement regarding gender. Result reveals that there was a significant main effect of gender on mean self-efficacy scores, anxiety scores and Mathematics achievement. Okafor-Agbala and Okigbo (2021) investigated on the relationship between self-efficacy and students' academic achievement in Mathematics, the findings reveals that, there is moderate positive relationship on mathematics self-efficacy and achievement in Mathematics and there's also significant interaction in among mathematics self-efficacy on Mathematics achievement.

Purpose of the Study

The purpose of this study was to determine:

1. Relationship between self-efficacy and students' academic achievement in Mathematics.
2. Relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender.
3. Joint relationship between students' self-efficacy, gender and students' academic achievement in Mathematics.

Research Questions

The following research questions guided the study;

1. What is the relationship between self-efficacy and students' academic achievement in Mathematics
2. What is the relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender?

Hypotheses

The following null (H_0) hypotheses were tested at 0.05 level of significance:

1. There is no significant relationship between self-efficacy and students' academic achievement in Mathematics.
2. There is no significant relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender.

Methods

The study adopted a correlation survey. The population of the study comprised of 2,840 senior secondary school two (SS2) Mathematics students from Ogidi Education Zone of Anambra state. The sample for this study comprised 1,420 senior secondary two (SS2) Mathematics students, the sample size were made up of 530 males, 890. The instruments for data collections were Mathematics self-efficacy Questionnaire (MSEQ) and Academic achievement scores in Mathematics. The MSEQ was adapted by the researcher from Abdul and Mohamed self-efficacy scale (2006), if consists of forty (40) items and five (5) point scale response ranging from exactly true, Nearly true, Neutral, Nearly False and Exactly false. It has a reliability coefficient of 0.85. Similarly, Student's termly results were obtained from the promotion result for 2024/25 academic session, which comprises first, second and third term respectively.

The questionnaire were validated by three experts, two from Science Education Department and one from Department of Education Foundation (Measurements and Evaluation), all from Faculty of Education, Nnamdi Azikiwe and subjected to pilot testing, using 60 students from Awka South Education Zone to yield the reliability coefficient of 0.85 established using cronbach alpha. The copies of questionnaire were administered to the students for answering and later collected by the help of research assistants and class teachers in each of the selected schools and there was no loss of any instrument. The data collected were analyzed using Pearson product moment correlation coefficient was used to answer research questions and test hypotheses at 0.05 level of significant. While Hayes process analysis was used to answer research questions 2 and test hypotheses at 0.05 level of significant because gender is a moderating variable in the study. In interpreting the correlation coefficients, the rule posited by Pritha (2023) about the interpretation was adopted for the study using the range of scores as thus:

Ranges of scores	Decision
$\pm 0.81 - \pm 1.00$	High positive or negative relationships
$\pm 0.31 - \pm 0.80$	Moderate positive or negative relationship
$\pm 0.00 - \pm 0.30$	Low positive or negative relationship

In interpreting the null hypotheses, the decision rule is that when P-value is less than or equal to 0.05 ($P \leq 0.05$) the null hypotheses was rejected. On the other hand, when P-value is greater than the alpha level 0.05 ($P \geq 0.05$), the null hypotheses was not rejected (accepted).

Results

Research Question 1: What is the relationship between self-efficacy and students' academic achievement in Mathematics?

Hypothesis 1: There is no significant relationship between self-efficacy and students' academic achievement in Mathematics.

Table 1: Pearson Correlation Coefficient for the Relationship between Self-efficacy and Students' Academic Achievement in Mathematics

Variables	N	r	R ²	Magnitude & Direction	Sig	Decision
Self-efficacy	1420	0.35	0.20	Moderate positive Relationship	0.94	Not Significant
Achievement						

The Analysis presented in Table 1, indicates a moderate positive relationship between self-efficacy and students' academic achievement in Mathematics. . A moderate positive correlation was found $r(1420) = 0.35$, $p = 0.94 > 0.05$) indicating a non-significant relationship between the two variables. The null hypothesis which stated that there is no significant relationship between self-efficacy and students' academic achievement in Mathematics is therefore upheld.

The data collected for the study were analyzed and presented in alignment with the stated research questions and hypotheses. Findings are summarize in the table and explained in details to provide both statistical and practical interpretations. The findings implies that students with higher self-efficacy tends to achieve better academically, though the link was not extremely strong.

Research Question 2: What is the relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender?

Hypothesis 2: There is no significant relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender.

Table 2: Hayes process analysis of relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender

Model Summary						
r	R-sq	MSE	F(HC4)	df1	df2	p
.391	.008	173.620	3.167	3.000	1416.000	.024

Table 2 reveals that the correlation coefficient (r) between self-efficacy and students' academic achievement in Mathematics as moderated by gender is 0.391 with a coefficient of determination (R-sq) of 0.008. This indicates that there is a moderate positive relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender. The coefficient of determination (R-sq) shows that 8% of the variance in secondary school students' achievement in Mathematics can be attributed to their self-efficacy as moderated by gender while 92% of the variance can be attributed to other factors not considered by this study. P-value 0.24 indicating that there is significance difference. There is a significant relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender.

Discussion

The relationship between students' self-efficacy and their academic achievement in Mathematics.

The findings of the study revealed that there is a moderate positive relationship between self-efficacy and students' academic achievement in Mathematics. Further analysis showed that there is no significant relationship between self-efficacy and students' academic achievement in Mathematics. The reason could be attributed to some environmental factors like inadequate facilities in the school as instructional materials and students' perception that, Mathematics is a difficult subject reserved only for a strong mind. This relationship between self-efficacy and students' academic achievement in Mathematics is moderately positive and not significant.

The finding is in agreement with Jambi *et al* (2024) indicated that self-efficacy positively influence students' performance. The finding is in line with Bini, and Idehen, (2023) who revealed a strong positive relationship between academic self-efficacy and Mathematics achievement. Also in line with Munir and Ogbeta (2024) who revealed strong positive correlation between self-efficacy and performance in Mathematics.

However, the finding of the study is not in agreement with Nwankwo, (2024) who found that students with special needs face challenges that can weaken self-efficacy and academic achievement. Nwankwo's observation could be as result that the researcher's study was done among secondary school students. Also the study is not in line with Anekwe, Opara and Nnorom (2024) who revealed that self-efficacy as a significant predictor of students' achievement in stoichiometry. The no significant relationship between self-efficacy and students' academic achievement in Mathematics as observed in the study.

The relationship between students' self-efficacy and their academic achievement in Mathematics as moderated by gender.

The findings of the study revealed that there is a moderate positive relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender. Thus, there is a significant relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender. This implies that gender moderates this link. It means that when gender is considered, the relationship becomes significant, and the strength differs across male and female students. The reason could be that many students especially female students do not have confidence in their self that they can learn and understand Mathematics concept if they even without additional support. The finding is in consonance with Bini, Josephine, Idehen, and Osadebamwen (2023) who revealed a strong positive relationship between academic self-efficacy and Mathematics achievement among male and female students. The finding is also in agreement with Bini, and Idehen, (2023) who revealed positive relationship between academic self-efficacy and academic achievement of male and female. On contrary, this finding is not in agreement with Mohammed, (2020) who found that there was a low positive relationship between students' self-efficacy and their academic achievement in Mathematics as moderated by gender.

Also, the finding is not in line with Bini, and Idehen, (2023) who revealed no significant relationship between academic self-efficacy and academic achievement of male and female. Either is the study in line with Bini, Josephine, Idehen, and Osadebamwen (2023) who revealed a no significant relationship between academic self-efficacy and academic achievement of male and female. By the virtue of this study, the study has joined group of scholars who observed that the relationship between self-efficacy and students' academic achievement in Mathematics as moderated by gender is moderately positive and significant.

Implications of the Findings

The implication of this study is that students to move from real classroom experience that is from textbook to actual student's knowledge, they pay attention to their studies and as well have confidence in themselves. To teachers, it enable them to plan and execute their lessons with less stress unlike those that does not believe in themselves This means that students who believe in their ability tend to achieve slightly better than those that does not believe in themselves.

Recommendations

The following recommendations were made;

- 1) Teachers should help students build self-confidence in Mathematics through regular practice, clear examples, and step-by-step feedback
- 2) Teachers and school managers should consider gender differences when planning interventions for self-efficacy, because only self-efficacy with gender showed a significant effect
- 3) Guidance counselors and class teachers should monitor students who show low confidence and offer support early, since self-efficacy at least showed positive results

Conclusion

The relationship between self-efficacy and students' academic achievement in Mathematics in Ogidi Education Zone, Anambra State, showed that self-efficacy has a moderately positive relationship with Mathematics achievement, but the relationship was not significant. When gender was considered, self-efficacy still showed a moderately positive and significant relationship with Mathematics achievement,

Overall, the study implies that students' self-efficacy and other qualities may help a little, but their combined and direct effects are weak for correlating Mathematics achievement among sampled secondary school in Ogidi Education zone in Anambra state.

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