



Relationship between Academic Self-Concept and Academic Performance in Mathematics of Secondary School Students in Delta State, Nigeria

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Abstract

The study investigated the relationship between self-concept and the academic performance in mathematics of secondary school students in Delta State, Nigeria. Two research questions and two null hypotheses guided the study. A correlation design was adopted in the study. All 42,299 senior secondary two (SS2) mathematics students in the 2021/2022 session in the state made up the research population. A multistage sampling procedure was used to draw 1,650 of these students. The instrument utilized to gather data was the Academic Self-Concept Questionnaire (ASQ), which was validated by three experts. The instrument's dependability was determined using Cronbach's Alpha, and the result was 0.68. The students' performances in Mathematics for three terms in SS1 represent their performance scores in mathematics. The collected data were analyzed using Pearson product moment correlation and a *t*-test for correlation analysis. The results of the study showed a very low positive and no significant relationship between academic self-concept and the performance of secondary school students in mathematics. However, there was a significant difference in relation to mathematics performance between students with a positive self-concept and those with a negative self-concept in mathematics. In light of the results, it was recommended among other things, that mathematics teachers should make a deliberate effort to help students who possess negative self-concepts by conditioning, modeling, and changing their behaviors to perform better in mathematics.

Keywords: Academic self-concept, academic performance, Delta state, mathematics

INTRODUCTION

The term "self" refers to the conscious reflection of one's existence or identity as an object distinct from others or the environment (Kumari & Chamundeswari, 2013). Thus, a person's entire set of beliefs, attitudes, and perceptions about themselves make up their self-concept. Self-concept is essential and important for a child's general growth in all facets of life (Parveez & Tariq, 2016). Parveez and Tariq argued that one's self-concept is made up of ideas about their own racial identity, gender roles, and academic performance.

Self-concept may be quite useful in understanding and foretelling student's behavior. In terms of educational growth and academic performance, a positive self-concept is frequently regarded as a desirable outcome (Marsh & Martin, 2011). This is the case

because, according to John et al. (2014), one of the most significant factors affecting students' academic performance is their self-concept. John et al. (2014) also emphasized that for students to succeed academically; they must identify with the academic field and have a strong academic self-concept. Students with a positive self-concept in regard to mathematics are more likely to succeed in the subject than those with a negative self-concept. In other words, if a student views mathematics as a difficult subject, they may grow to have a negative view of themselves and this may have an impact on their performance in the course. This is known as having an academic self-concept.

Academic self-concept is an assessment of students' perceptions based on their experience and interpretation of the events they encounter in school, which results in

particular attitudes, feelings, and perceptions about their intellectual and academic abilities depending on the academic domain (Peteros et al., 2019). It may be described as how a student sees or perceives himself or herself in the classroom. Academic self-concept is the idea of the student in his or her academic activities in connection to a particular subject, teacher, and school, according to Tang (2011). It evolves as a result of repeated academic performance or failures over time, particularly in the earliest years of a child's development. According to Izuchi and Onyekuru (2017), both a positive and high level of academic performance and vice versa lead to a high degree of academic self-concept. The belief in and feelings about one's mathematical ability are referred to as one's mathematical self-concept or self-concept in mathematics.

According to Peteros et al. (2019), a student's perception of their mathematical abilities, aptitude, enjoyment, and interest is viewed as a crucial component in how well they succeed in the subject. Students' self-views regarding their academic ability may affect how much effort they put into schoolwork (Farrington et al., 2012; Peteros et al., 2019). These perceptions are also crucial in their attempt to adjust to their schoolwork and obligations. According to Peteros et al. (2019), students with positive self-concepts in particular subjects are more likely to make an effort to perform well on any tasks assigned in that subject. This will consequently have a beneficial impact on how well they succeed in the subject. Students with strong mathematical self-concepts are likely to do better in any mathematics assignment. As a result, enhanced academic performance may be strongly correlated with a strong academic self-concept. However, a student may have a positive perception of their academic abilities in a specific field of study while still lacking the desire to pursue a particular subject, like mathematics.

Njoku and Okigbo (2021) used a correlation survey design to examine the extent to which emotional intelligence and academic

self-concept influence senior secondary school three (SS3) students' academic achievement in mathematics in Imo State, Nigeria. One of their findings showed that academic self-concept did not predict secondary school students' achievement in mathematics.

In another country, students from four schools in the Vhembe District of South Africa were studied by James et al. (2021) to determine the relationship between mathematics self-concept and academic achievement using a correlation design and a sample size of 236 students. The results showed that academic achievement was positively and strongly predicted by mathematics self-concept.

Similarly, in Ibadan City, Oyo State, Nigeria, Kamoru, and Ramon (2017) investigated the relationship between self-concept, attitude of the students towards Mathematics, and Mathematics achievement using a sample size of 200 SS2 students (124 females and 74 males). The results showed a significant relationship between students' self-concept and mathematics performance. In a related study carried out in Ankpa Local Government Area of Kogi State, Nigeria, Adown (2016) studied the students' attitudes and self-concept as correlates of their achievement in senior secondary school mathematics using a correlation study design with 3,301 SS2 students as the population. The average results from the students' SS2 three-term examinations were used to measure academic performance, while the Mathematics Academic Self-concept Questionnaire (ASCQ) was employed as the study's instrument for measuring mathematical self-concept. The results showed a significant connection between students' achievement in senior secondary school mathematics and their self-concept. Many studies have been carried out in different countries and different states in Nigeria but such studies on the correlation between academic self-concept and academic performance of secondary school students in mathematics have not been researched in Delta State, Nigeria. Based on the foregoing, it is crucial to determine if academic self-concept is

connected to the academic performance of secondary school students in mathematics in Delta State, Nigeria.

The performance of students in secondary schools in mathematics is still poor despite the efforts of the government and professional organizations like the Mathematical Association of Nigeria (MAN) to promote study and mathematics learning. The mathematics proficiency of these students has been attributed to a number of variables, including: a shortage of competent mathematics teachers, inadequate instructional materials, students' learning capacity, and others.

Despite much research that has been done and is still being done to determine ways to enhance mathematics performance, the majority of secondary school students still do badly in the subject. The National Bureau of Statistics' (2016–2018) report on the WAEC results for Delta State students shows that students' mathematics performances have not improved. Students' negative self-concept may be the cause of this. Many secondary school students opt not to take mathematics classes or focus on it in their studies. Even some parents help their children pass mathematics examinations using shady methods. Some students engage in examination malpractice with the assistance of WAEC officials. As a result, these individuals don't prepare to pass mathematics examinations, which ultimately leads to poor mathematics performance.

The study set out to achieve the following objectives: 1) Investigate the relationship between secondary school students' academic self-concept and their academic performance in mathematics; 2) Compare the academic performance scores of secondary school students with positive academic self-concepts with those of those with negative academic self-concepts in mathematics.

The following research questions were formulated to guide the study: 1) What is the relationship between academic self-concept and academic performance of secondary school students in Mathematics? 2) What is the

difference between the academic performance scores of secondary school students who possess a positive academic self-concept and those with a negative academic self-concept in mathematics?

METHODS

In this study, the correlation design was used. The population of the research consisted of 42,299 senior secondary two (SS 2) students in mathematics in the 466 public secondary schools dispersed throughout the 11 educational zones in Delta state, Nigeria. The sample drawn from 2021/2022 academic year consisted of 1,650 students from 22 schools. A multi-stage sampling procedure was employed for the selection. The instrument used to collect the data was the Academic Self-Concept Questionnaire (ASQ). ASQ was adapted from Oluwatayo (2011) Academic Self-Concept. Four options were provided on the questionnaire for respondents to select from: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The academic performance of the students was assessed using their mathematics scores from the three terms of the academic year 2021/2022. The students' performances in Mathematics for three terms in SS1 represent their performance scores in mathematics. The ASQ was validated by three experts, one from the Department of science Education and two from measurement and evaluation unit of the Department of Educational Foundations all from Nnamdi Azikiwe University, Awka. A comparable group of 150 students in Edo State secondary schools who were not part of the research received the same administration of the instrument (ASQ). The ASQ items' internal consistency was evaluated using Cronbach's alpha statistics, and the alpha coefficient value was 0.68. It was decided that this value was sufficient and that the instrument was reliable. The research questions were answered using the Pearson product Moment Correlation coefficient while the *t*-test of correlation analysis was used to test the null hypotheses at 0.05 alpha levels

The criteria outlined by Nworgu (2015) served as a reference for interpreting the correlation coefficient. These are listed below: Low positive (negative) correlation ranges from 0.01 to 0.30 (-0.01 to -0.30), moderate positive (negative) correlation ranges from 0.31 to 0.79 (-0.31 to -0.79), and high positive (negative) correlation ranges from 0.80 to 1.00 (-0.80 to -1.00).

RESULTS AND DISCUSSION

Research Question One

What is the relationship between academic self-concept and academic performance of secondary school students in Mathematics? Table 1 shows the result.

Table 1. Pearson Product Moment Correlation Statistics Showing Relationship Between Self-Concept and Performances in Mathematics

Variable	<i>N</i>	<i>R</i>	<i>r</i> ²	<i>r</i> ² %	Sig (2-tail)
Self-concept-performance	1650	-0.025	0.00063	0.063	0.864

From Table 1, there is a low negative correlation between self-concept and performance in mathematics ($r = -0.025$). The findings indicate a -0.025 correlation coefficient between the two variables. This suggests that there is little evidence of a relationship between students' self-concept and their academic performance in mathematics. According to the -0.025 Pearson correlation coefficient, self-concept has a 0.063% impact on academic performance in mathematics.

Research Question Two

What is the difference between the academic performance scores of secondary school students who possess positive academic self-concept and those with negative academic self-concept in mathematics? Table 2 presents the result.

Table 2. Independent *t*-test Analysis of Students' Levels of Self-Concept, Percentages, and Their Academic Performance in Mathematics

Group	<i>N</i>	Percentage	<i>t</i> -value	<i>P</i> -value
Positive Self concept	1600	97	3.73	0.000
Negative Self concept	50	3		
Total	1650	100		

In Table 2, 1,600 students (97%) have a positive self-concept in mathematics, whereas 50 students representing 3% have a negative self-concept. This implies that a greater percentage of students had a positive self-concept of themselves about mathematics. According to this, the majority of students had a positive self-concept about mathematics. The percentages stated under positive and negative self-concept were determined by the way the questionnaire was structured. The levels of the students were determined by their percentages. From the result, students with a positive self-concept were 97 percent which accounted for their level whereas 3 percent of the students had a negative self-concept which also accounted for their level of self-concept. This implies that more of the students possessed a positive self-concept in mathematics

Hypothesis 1: There is no significant relationship between academic self-concept and academic performance of secondary school students in Mathematics.

Using Pearson product moment correlation data, which are displayed in Table 1, hypothesis one was evaluated to see if there is a significant relationship between the two variables. Since the significant value (Sig.2-tailed) of 0.864 is more than the value 0.05, there is no significant correlation between mathematics students' self-concept and academic performance. It follows that the null hypothesis, which asserts that there is no

significant relationship between academic self-concept and secondary school students' academic performance in mathematics, is not rejected.

Hypothesis 2: There is no significant difference between the academic performances of secondary school students who possess positive academic self-concept and those with negative academic self-concept in mathematics.

From Table 2, students who have a positive academic self-concept regarding their academic performance in mathematics had a percentage of 97, which is greater than the percentage of students who have a negative academic self-concept in mathematics. The fact that the p -value (0.000) is less than the significant value of 0.05 gives the impression that there is a significant difference between the variables. The null hypothesis two which states that there is no significant difference between the academic performances of secondary school students who possess positive academic self-concept and those with negative academic self-concept in mathematics, was rejected because there is a significant difference in the academic performances of secondary school students who have positive academic self-concept and those who have negative self-concept in mathematics.

Discussion

The relationship between secondary school students' self-concept and their academic performance in mathematics was established in Table 1. From the table, it revealed that there was no significant correlation between mathematics students' self-concept and their academic performance. This suggests that there was no significant correlation between secondary school students' academic performance in mathematics and their academic self-concept. The findings of the current study, which showed that there was no significant relationship between secondary school students' academic self-concept and their academic performance in mathematics, are in contrast to the study by Ajunwo (2018), which found a significant relationship between

students' self-concept and their academic achievement scores. It follows that students with a positive self-concept may not necessarily do better than the other students with a negative self-concept as there was no significant connection between secondary school students' self-concept and their academic performance in mathematics.

The results of the current study contradict those of Ajmal and Rafique (2018), who found a significant positive relationship between academic self-concept and achievement. According to the results of the current study, there was no significant relationship between academic self-concept and students' academic performance. Since there was no connection between these variables it implies that improving students' academic self-concept may not always result in greater academic performance in mathematics. There may be other variables that may contribute to or be accountable for secondary school students' performance in mathematics.

According to the findings of Njoku and Okigbo (2021), academic self-concept does not predict the academic performance of secondary school students, which is consistent with the findings of the current study, which found no significant correlation between secondary school students' academic self-concept and their academic performance in mathematics. This suggests that students who have a negative academic self-concept may nonetheless excel in mathematics. Since there was no significant correlation between secondary school students' self-concept and their academic performance in mathematics, it also implies that higher academic self-concept and higher academic performance in mathematics may not be correlated with each other.

Contrary to the current study's findings, which show no significant correlation between secondary school students' self-concept and their academic performance in mathematics, Jaiswal and Choudhuri (2017) and Kamoru and Ramon (2017) found a positive and significant relationship between secondary school students' academic self-concept and academic

achievement. Since there was no significant correlation between secondary school students' self-concept and their academic performance in mathematics, it therefore implies that a higher academic self-concept may not result in higher academic performance in mathematics and a lower academic self-concept may not also result in poor academic performance. The results of the current study contradict those of James et al. (2021), who found that academic success in mathematics was positively and strongly predicted by mathematics self-concept. The results of the current study showed that there was no significant relationship between secondary school students' academic self-concept and mathematics performance. Since there are no connections between the variables, it shows that improving students' academic self-concept may not necessarily help them do better in mathematics and that there may be other factors that the students need to help them succeed in the subject.

The results of Adown (2016) investigation into students' self-concepts as correlates of their performance in senior secondary school mathematics showed a significant relationship between students' self-concept and their academic performance in senior secondary mathematics, which is in contrast to the findings of the current study. The results of the current study contradict those of Parveez and Tariq (2016), who found a significant relationship between the academic achievement of students and their self-concept. Since there was no significant correlation between the students' self-concept and their academic performance, the results of the current study imply that students with a positive self-concept may not perform academically in mathematics any better than those with a negative self-concept. This suggests that students who have a high self-concept might not do better academically, and vice versa, for those who have a bad self-concept.

The findings from Table 2 on the difference between the academic performance scores of secondary school students who possess a positive academic self-concept and

those with a negative academic self-concept in mathematics showed that students who have a positive academic self-concept in regards to their academic performance in mathematics had percentages of 97, which is greater than the percentage of students who have a negative academic self-concept in mathematics.

The study by Obilor (2011) on the relationship between senior secondary students' mathematics achievement and self-concept found that there was a significant positive relationship between students' mathematics achievement and their self-concept, which is consistent with the findings of the current study. Since there was a positive correlation between students' mathematics self-concept and academic performance, it follows that students with a positive mathematics self-concept may typically outperform those with a negative mathematics self-concept. The relationship between a student's self-concept and their academic performance in mathematics suggests that this relationship may be a contributing component that makes it easier for students to perform differently in mathematics, which may then have an impact on that student's academic performance. In a study conducted by Jaiswal and Choudhuri (2017), the relationship between secondary students' academic achievement and academic self-concept was investigated. From the authors findings, it was revealed that higher academic self-concept is associated with a higher academic achievement, which is consistent with the findings of the current study.

In their study, Parveez and Tariq (2016) examined the relationship between academic achievement and self-concept among secondary school students in the Jammu District of India. According to the research, there is a strong correlation between students' academic achievement and their self-concept, suggesting that students with a positive self-concept perform better academically than those with a negative self-concept, which is in line with the findings of the current study. Also, Nalah (2014) conducted a study on the influence of students' self-concept on their academic achievement at the College of Education in

Akwanga, Nasarawa State, Nigeria. In line with the current study, the results showed a statistically significant association between students' high and low self-concept and academic achievement. Students must have a good view of themselves as mathematicians in order to perform successfully.

CONCLUSION

The researcher came to the conclusion that there was a very low positive relationship between secondary school students' academic self-concept and their academic performance in mathematics. Additionally, it was shown that students with positive and negative mathematics self-concepts performed significantly differently in mathematics tests and examinations. From other research studies and the findings of this current study, it was revealed that students with a positive self-concept perform better academically while students with a low self-concept tend to perform poorly in mathematics.

The study's conclusions led to the following recommendations: 1) Teachers of mathematics should make sure that secondary school students are facilitated in examination situations to enhance students' self-concepts in mathematics; 2) Parents/guardians and school administration should work together to encourage students' positive self-concept, which always leads to strong performance in mathematics among secondary school students; 3) Teachers of mathematics should have enough training to help students develop a positive self-image or self-concept and increase their confidence in the subject, which should improve their performance in school; and 4) Appropriate workshops and seminars should be organized for the students' benefit in order to help them develop their mathematical self-concept and increase their self-confidence.

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