

**INFLUENCE OF SELF- CONCEPT ON THE PERFORMANCE OF SECONDARY
SCHOOL STUDENTS' IN MATHEMATICS IN
CALABAR SOUTH LOCAL GOVERNMENT AREA, CROSS
RIVER STATE – NIGERIA.**

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Abstract

The purpose of this paper is to investigate the influence of self-concept on the performances of secondary school students in Mathematics in Calabar South Local Government Area of Cross River State-Nigeria. The research design used was Ex-post facto design. A sample size of three hundred and twenty (320) senior secondary school two (SS 2) students was examined. Self-concept questionnaire for teachers and Mathematics performance test for students were used in generating the data for the study. The reliability of the instrument was determined using Kuder-Richardson-20 which give 0.83. Two hypotheses were formulated to guide the study and the data collected were analysed using One Way Analysis of Variance and independent t-test. The major findings of the study showed that students with high self-concept perform academically better than those with average self-concept. Gender showed no significant difference in academic performance of students with high self-concept. It was therefore recommended that teachers should develop in their students' positive self-concept towards Mathematics and pleasant teaching experiences to enhance higher self-concept and better performance in mathematics.

Keywords: *Self – concept, performances of secondary school students, Mathematics, Calabar South Local Government Area*



Introduction/Background

Mathematics is an essential subject in science, technology and society, “yet students’ achievement in Mathematics is poor at most levels of learning” (Ayodele, 2011). The degree and direction of attitude towards

Mathematics are largely determined by the kind of interest developed by students for it. Generally, attitudes, self -concept are fundamental to the dynamic change of behaviours. Students’ lose interest in the subject because they experienced difficulties.

These difficulties came as a result of the language used in teaching, the calculations involved, the symbols associated with it, fear and teachers' poor attitude to work. Only few students pass the subject even those who passed the subject are usually with low grades (Ayodele, 2011). Practically, all students believe that mathematics is important for life yet, they demonstrate some negative attitude towards the subject. They perceived that, the subject is abstract, difficult and uninteresting, thus are biased in the selections they make, and often not considering the subject requirement needed for future careers (Ibok, Thomas & Nkereuwem, 2019).

The ugly situation continues yearly as students no longer take study of Mathematics seriously and they are not encouraged to do so. Also worrisome is the ignoble role some parents and teachers play in aiding and abating illegal means to pass mathematics examinations (Abdul-Jaleel & Dawson-Brew, 2014). This has registered a wrong impression in the subconscious mind of students that they may not be able to study, understand and perform well in mathematics without cheating. If the current trend is not checked, it could lead to a dearth of Mathematician and Mathematics educators in the nation in future after the retirement of the present Mathematics educators. Self-concept is the cognitive aspect of self and is entirely referred to as intricate, well organized and dynamic system of learned beliefs, attitudes and opinions which an individual hold to be true about his/her personal existence. The interact ability of Self-concept and achievement are usually dynamic and mutual. The way an individual perceives himself influences the way he behaves in interaction with his physical and social environment (Barbara, 2000). In other words, a person's action is the outcome of the picture the person has of himself, his understanding of

his abilities, capabilities, interest, values, achievements, needs as well as his limitations. On this basis, a student who believes he/she cannot perform well in a particular school subject may not have much interest in the subject and will not put in much effort on the study of that subject as he would have in others. This is in line with Purkey (2000) who argues that the motive behind all behaviours is self. He also contends that people are constantly trying to behave in a manner which is consistent with the way they view themselves. Self-confidence and self-concept are required for a person to achieve success in all human endeavours. According to Asagwara (1999), one has to experience within oneself some feeling of capability and self-trust to enable the person participate actively and efficiently in whatever one engages oneself. This view is in line with Okafor (2000) who refers to self-concept as the individual comprehensive evaluation of himself in terms of his abilities, attitudes, judgment and values, stressing further that if a student perceives himself as main academic failure his effort in study is affected disastrously. Where he perceives himself as successful, this will affect his efforts in his academic work. This implies that attempt should therefore be made by each student to dwell more on his success than on his failure. Students perform well in academic work when they are obsessed with positive and encouraging thought of themselves. This discussion seems to highlight self-concept as a variable that has link with academic achievement of students. This provides a gap that this research seeks to fill empirically.

Self-concept and achievement are dynamically interactive and reciprocal, each is mutually reinforcing to the extent that a positive (or negative) change in one facilitates a commensurate change in the other and academic self-concept is more

highly correlated with academic achievement than in general self-concept. Students with high self-concept tend to approach school related tasks with confidence and success of those tasks reinforces this confidence. The opposite pattern is likely to occur for children with low academic self-concepts.

Academic self-concept relates to academic achievement and is defined as the belief in and feelings or perceptions of one's own intellectual and/or academic skills and achievement (Lent, Brown, & Gore, 1997). Marsh and Martin (2010) found that academic self-concept has direct and indirect effects on academic achievement. This indicates a bidirectional relationship; Increases in academic self-concept lead to increases in academic achievement and vice versa. The findings confirm that academic self-concept plays an important role in influencing academic outcomes. The results are in line with the study by Khalaila (2015) which shows that a high academic self-concept directly relates to better academic achievement. Specifically, for math, there is a correlation between math self-concept and math achievement in children, (young) adolescents, and young adults (Atunes & Fontaine, 2007; Luo et al., 2014; McWilliams, Nier, & Singer, 2013; Parker, Marsh, Ciarrochi, Marshall, & Abduljabbar, 2013). Math self-concept refers to the belief in and feelings about one's own math competence (Atunes & Fontaine, 2007). McWilliams and colleagues (2013) found that math self-concept more strongly relates to math achievement than academic self-concept. These findings are in line with the specificity principle of Swann, Change-Schneider, and McClarty (2007) that states that a domain-specific self-concept should be used to predict domain-specific achievement. Hence, there appears to be a correlation between math self-concept and math achievement.

Student achievement in mathematics has been an important variable examined in several comparative projects, including the Third International Mathematics and Science Study (TIMSS) in 1995 and a repeat of TIMSS (TIMSS-R) in 1999. On the other hand, mathematical self-concept represents student perception or belief in self-ability to do well in mathematics, and is recognized as a key component of mathematical literacy (NCTM, 1989). A reciprocal effects model suggests that academic achievement and self-concept are mutually reinforcing, and changes in academic self-concept can lead to changes in academic achievement or vice versa (Marsh, Byrne, & Teung, 1999). Marsh, Hau, and Kong (2002) observed, "despite some apparent exceptions, the results of previous research provide general support for a reciprocal effects model" (p. 730).

As a basic subject taught in almost all schools, mathematics is an appropriate subject to examine the reciprocal model using an international database. Despite similarities in mathematical symbols, cultural factors need to be considered when investigating mathematics education in an oriental context (Wilkins, 2003). In particular, Holliday and Holliday (2003) noted, "language is an important cultural factor when comparatively assessing students who speak, read, write, and listen using entirely different communication system" (p. 252). In Hong Kong, shortly after termination of its British colony status in 1997, a policy change has been made to switch the language of instruction from English to Chinese in most secondary schools (Evans, 2000). Accordingly, the status of English language has been included in this investigation to examine the relationship between student self-concept and mathematics achievement.

Theoretically, the impact of self-concept on academic performance outcomes

is compelling. Research indicates that self-concept influences academic performance differently depending on race or culture (Hartman and Everson, 1996; Picou et al., 1977; Rouse and Cashin, 2000; Worrall, 2007). Yet little empirical research has examined whether self-description influences student academic performance outcomes across cultures (Marsh et al., 2006). Marsh et al (2002), in discussing the impact of Chinese culture on self-concept, stated that previous research suggests that Chinese students differ from Western students in ways that may be relevant to how they construct their self-concepts. In a related study examining the self-description of American and Chinese children, Wang (2004) found that Chinese children focused on social roles and interactions in describing themselves while American children focused more on individual roles and personal goals. Wang suggests therefore that cultural values and beliefs about self-play a crucial role in shaping an individual's self-concept. The study concludes that the framework of culture is embodied in the construct of the self. In addition, relative to the relationship between self-concept and academic performance, Giota (2006) conducted a study in Sweden on a large population of students (n=7,367) concerning relationships between adolescents' goal orientation, academic achievement, and self-evaluation. The results of Giota's study support the notion that beliefs about the self are multidimensional. Further, Swedish students (age 13 years old) who perceived their competence negatively showed lower academic performance and self-evaluations of competence, lower future expectations of success with respect to most academic school subjects, and higher levels of anxiety when compared to other students. These results are contrary to a study conducted in the United States with a similar age group which found that lower academic

performance did not affect perceived self-evaluation (Cokely, 2002). In addition, studies with African American students have found an indirect causal relationship between self-concept and academic performance (Allen, 1980; Awad, 2007; Cokely, 2000, 2002). These studies support the assumption that individuals' beliefs about the self are hierarchically organized and involve beliefs about general or global competence as well as beliefs about specific abilities that are valued by the culture.

Another study examining gender influence on students' academic performance in Mathematics, Iwendi (2009) investigated the influence of gender and age on the Mathematics achievement of secondary school students in Minna Metropolis, Niger State, Nigeria. 195 students' intact classes selected by stratified random sampling from purposefully selected schools were used. 50-items Mathematics Achievement Test (MAT) was administered to the students. Mean, standard deviation and t-test were used to analyze the data obtained. The findings showed that: (i) younger male students performed better than older female students; (ii) the older male students performed better than older female students; and (iii) no significant difference in the performance of younger and older students (overall).

According to Adebule (2004) man's educational aspirations and accomplishment are projected by the psycho-social variable in his environment. These variables in take unique positions in human beings since they are necessary for understanding human overt and covert actions, potentialities and their performances in the cognitive affective and psychomotor domains of education.

Ayodele, (2011), investigated the relationship between self-concept and performance in Mathematics as well as the influence of gender on self-concept and performance in Mathematics in Ekiti State.

Using Pearson product moment correlation and t-test statistics, tested at 0.05 level of significance. The results showed that self-concept moderately correlated with performance in Mathematics, while gender had no significant influence on self-concept and performance in Mathematics. However, the mean scores of male and female students in Mathematics were below average.

Stephen (2011) investigated the influence of self-concept on students' academic achievement in secondary schools. The study was conducted in Uyo LGA of Akwa -Ibom State in Nigeria. A sample size of five hundred (500) senior secondary two physics students took part in the investigation. Two researcher made instruments, Self-concept Questionnaire (SQ) and Physics Achievement Test (PAT) were used in generating the data for the study. The reliability of the instruments determined using Cronbach Alpha were 0.77 for SQ and 0.72 for PAT. Two hypotheses were proposed to guide the investigation and the data that accrued from the study were analysed using independent t-test. The major findings of the study showed that students with high self-concept achieved academically higher than those with low self-concept. Gender showed no significant difference in academic achievement of physics students with high self-concept.

Jaiswal & Choudhuri (2017) examined the relationship between academic self-concept and academic achievement of secondary students and as well compared the academic self-concept of male and female secondary students. Sample of the study were 615 secondary school students of both genders (Male 317, Female 298, aged 14-17 years). The sample was drawn from 15 secondary schools affiliated with CBSE board, session 2016-17 of Varanasi city, India. Academic achievement was measured by self-reported Cumulative Grade Point

Average (CGPA) of the previous year. Academic self-concept was measured using Kample & Naik (2013) Academic Self Concept Scale (ASCS), which was composed of 57 items, distributed in 8 subscales namely Academic Ability, Academic Interests, Study, Examination, Academic Interaction, Academic Efforts, Curriculum, and Academic Future. The result of the study revealed that there was a positive relationship between academic self-concept and academic achievement and this relationship was stronger for female students ($r = .28$) than that of male students ($r = .17$). Moreover, gender differences in the academic self-concept of the students were also found. Female students had significantly higher academic self-concept than male students.

Lone and Lone (2017), conducted a study on the relationship between self-concept and academic achievement and find a significant relationship between self-concept and academic achievement.

Fisher (2008) also found no gender difference in Mathematics performance Mullis, Martin and Foy (2008) in their studies found that males continue to outperform females on standardized tools measuring Mathematics performance. Abdul-Jaleel & Dawson-Brew (2014) investigated the influence of student's self-concept on their academic performance. A total of 297 randomly selected junior high school students in the Elmina Township, Ghana completed the questionnaire, comprising 40 close-ended items related to student's self-concept constructs derived from the literature. The average scores of the second term test-scores of students in Mathematics, Integrated Science, English Language and Social Studies were used to measure pupils' academic performance. The questionnaire used for the study was a five-point scale questionnaire. The Cronbach's alpha was used to test for the reliability of the

questionnaire. The reliability coefficient was 0.86. Both descriptive and inferential statistics were used to analyse the data. It was found out that students' self-concept is perceived positively by students; however, this self-concept does not directly predict students' academic performance

Oluwatosin&Bamidele (2014) investigated the correlation between self-concept and academic performance in chemistry among secondary school students in Ile-Ife. The study adopted descriptive survey research design. 202 SSII students were used for the study. The results revealed that there was a positive correlation between students' self-concept and their academic performance. Ibok, Thomas, and Okri (2015) in their study found Self-Concept to a significant influence on students' academic performance.

Statement of Problem

The persistent poor performance of students in mathematics has been a great concern to parent, teachers, and even stakeholders in education. Despite the effort of mathematics teacher to see how they could improve on the performances of students; the reverse is the case as students' performances especially in external examination continues to deteriorate year after year. Adeniyi (1988), in agreement with this, stated that one's involvement in marking of mathematics for West Africa Examination Council (WAEC) is enough to get one sorrowful at the state of mathematics in secondary school today. He also added that many candidates submit their script without writing anything on them; some merely copy the questions while a high percentage of those who even try to write anything at all score below 40%.

Many students perceive mathematics as a difficult subject thereby showing little or no interest in the subject. This is capable of hindering them living their dream and

aspiration in life.

It is on this note that the researchers seek to investigate the influence of self-concept on the performance of secondary school students in mathematics in Calabar South Local Government Area of Cross River State.

Purpose of the Study

The purpose of this study is to investigate the influence of self-concept on the performance of secondary school students in mathematics in Calabar South Local Government Area of Cross River State. Specifically, the study seeks to address:

- (a) Self-concept on students' academic achievement in Mathematics.
- (b) Determine the academic difference of male and female secondary school students' academic performance in Mathematics

Research Hypotheses

The following research hypotheses were posed to guide the investigation:

1. There is no significant influence of self-concept on academic Performance of secondary school students in Mathematics.
2. There is no significant difference in academic performance in Mathematics between male and female secondary school students

Significance of Study

This study will be beneficial to the students, teachers, curriculum planners, researchers, school administrator. Firstly, it will expose the student of the danger of perceiving mathematics as an abstract or difficult subject which can further affect their performances in the subject. Secondly, when teachers learnt of the result of the result of the study in workshop, seminar and publication, it will expose them to some of the instructional strategies that could made them competent in

their teaching profession which when applied, will help to reduce the influence of self-concept on the performances of students in mathematics. Thirdly, the researcher will find the result useful in the sense that, more detailed study shall be carried out to determine the influence of self-concept of the performances of students in mathematics. Lastly, the school administrators may benefit from the result of the study through publication. They may also utilize them for the enhancement and development of positive self-concept towards mathematics in order to improve their performance in mathematics. They may also subject their teacher to go for further in services training so as to develop a positive self-concept of students in mathematics.

Research Methodology

The research area is Calabar South Local Government Area. The research design used was ex-post facto design. The population size for the study was all Senior Secondary two (SS2) students comprise of 1,410 males and 1325 females respectively (Cross River State Secondary School Education Board; CRSSEB, 2021). SS2 students were found suitable for the study since they had covered a number of topics and are familiar with the resources in the school. The sample for the study consisted of 320 Senior Secondary School two (SS 2) which is made up of 160 males and 160 females selected from 5 public secondary schools in Calabar South Local Government Area. A multi-stage sampling technique involving purposive, proportionate and simple random technique was adopted in selecting 320 SS 2 students for the study. Simple random sampling technique was used to select the required sample for the study; purposive was used to select only SS 2 students for the study.

Research Instruments

The instrument used for data collection was Self-concept questionnaire for teachers and Mathematics performance test for students which were used in generating the data for the study. The face content and construct validity criteria were ensured using experts in Test and Measurement in University of Calabar who vetted the test items and modified some.

The reliability coefficient of the instrument (MPT) was estimated using Kuder-Richardson-20 which give 0.83. The instrument was a 30-item multiple choice Mathematics Performance Test (MPT) drawn from the First Term syllabus of senior secondary school two (SS 2) Mathematics, based on three levels of cognition namely, knowledge, understanding and application. The difficulty indices of the items ranged from 0.42 to 0.91 using 27% upper and lower total score. The hypotheses were tested using One Way Analysis of Variance and Independent t-test.

Results

The result of the analysis is presented in the table 1, 2 &3. The hypotheses were tested at .05 significance level.

Hypothesis one: There is no significant influence of self-concept on academic Performance of secondary school students in Mathematics. The independent variable in this hypothesis is students' self-concept (categorized as High, Average and Low), while the dependent variable is students' academic achievement in Mathematics. Based on this categorization, one-way analysis of variance (ANOVA) test statistics was employed in testing the hypothesis based on their academic achievement in Mathematics. The result of the analysis is presented in Table 1.

Table 1: One-Way Analysis of Variance on influence of students’ self -concept on their academic achievement in Mathematics

| Self –concept | N | X | SD | | |
|----------------------|-----------|-------|----------|---------|---------|
| Low | 118 | 13.63 | 3.56 | | |
| Average | 130 | 14.96 | 4.08 | | |
| High | 72 | 12.32 | 3.25 | | |
| Total | 320 | 13.88 | 4.02 | | |
| Sources of variation | SS | Df | MS | F-value | P-value |
| Between group | 2672.121 | 2 | 1336.061 | 19.461 | .000 |
| Within group | 21762,678 | 317 | 68.652 | | |
| Total | 24434,799 | 319 | | | |

The result of analysis in Table 1 (F=19.461; p=.000) indicated that the null hypothesis was rejected at 0.05 level of significance while the alternate was upheld. This implies that there is a significant influence of students’ self -concept on their academic achievement in Mathematics. The result also shows that the mean score of students with average is higher,

followed by students with low self-concept, and followed by students with high self – concept. This implies that the students with average self- concept performed better in Mathematics than students with low and high self –concept. A post hoc multiple comparison test was used and the result is presented in Table 2.

Table 2: LSD post hoc test analysis on the influence of students’ self-concept on their academic achievement in Mathematics

| Self -concept | Low (n=118) | Average(n=130) | High(n=72) |
|---------------|--------------------|--------------------|------------|
| Low | 13.63 ^a | -1.33 ^b | 1.31 |
| Average | 1.31 ^{*c} | 14.96 | 2.64 |
| High | 2.25 | 1.10 | 12.32 |
| Mswithin | 68.652 | | |

P<.05

a= Group mean along the principal diagonal

b= Mean differences above the principal diagonal

c= t-values below the principal diagonal.

The Post hoc multiple comparisons test result indicates the Fisher’s significant t-value of 2.25 and a non-significant of 1.33 and 1.10 which mean that Students’ with low high self-concept (t=2.25; p=.000) significantly difference in their academic achievement in Mathematics. This also implies that students with low self -concept with mean score of 13.63 performed better in Mathematics than their counterpart from high self-concept with mean score 12.32. The result also shows no significant difference in academic performance of students with

low/average concept and average and high self- concept.

Hypothesis two: There is no significant difference in academic performance in Mathematics between male and female secondary school students. The independent variable in this hypothesis is gender while the dependent variable is students’ academic achievement in Mathematics. To test this hypothesis, respondents were classified into two groups (Male and female). Based on the classification, their means were compared using the independent t-test analysis and the

result is presented in Table 3.

Table 3: Independent t-test analysis of the significant difference in achievement of Mathematics on the basis of gender among secondary school students

| Variable | N | X | SD | t-value | p-value |
|----------|-----|-------|------|---------|---------|
| Male | 160 | 13.42 | 3.52 | 0.722 | .213 |
| Female | 160 | 13.15 | 3.16 | | |
| Total | 320 | 13.29 | 4.12 | | |

*Not Significant at 0.05 level

The result of the analysis ($t=0.722$; $p=0.213$) as presented in Table 3 indicated that there is no significant influence of students' gender on academic achievement in Mathematics. With this result, the null hypothesis was accepted at 0.05 level of significance and alternative hypothesis was rejected.

Discussion

In this study, the relationship between self-concept and performance in Mathematics as well as the influence of gender on self-concept towards Mathematics and performance in Mathematics were investigated. The result in table 1 showed a positive and moderate significant relationship between self-concept and performance in Mathematics with a correlation coefficient of 0.569. This result is in line with the previous findings of Muijs (1997) who obtained a correlation coefficient of 0.55 and Kamba (2009) who obtained a correlation of 0.695 between Mathematics self-concept and Mathematics grades. The moderate correlation between self-concept and performance in Mathematics in the present study is an indication that the way the students thought of, felt about, acted towards, valued and evaluated them in Mathematics moderately related to their performance in Mathematics. This finding also supports the view of Valentine, Dubois & Cooper (2004) that self-concept is an important linkage to academic achievement. The result in table 2

showed that gender has no significant influence on self-concept towards Mathematics as the difference in the mean scores was not significant.

This result is contradicted with the findings of Iwendi (2009) who found that boys seem to have a more positive self-concept than girls in a number of dimensions including Mathematics. The lack of gender influence in self-concept is not surprising because the sample for the study was selected from co-educational schools with similar learning environment and common quest for academic achievement. This result replicates the finding of Fisher (2008) who found no gender difference in Mathematics performance but at contradicted with the findings of Mullis, Martin & Foy (2008) who found that males continue to outperform females on standardized tools measuring Mathematics performance. Notwithstanding, it is expected, from a theoretical viewpoint, that high and positive self-concept should match high performance in Mathematics which is slightly lacking in this study.

Conclusion

Based on the findings of this study, it could be concluded that self-concept moderately related to performance in Mathematics and that gender had no influence on self-concept towards Mathematics and performance in Mathematics.

Recommendations

Based on the findings and conclusion of this study, the following recommendations were made:

- 1) Mathematics teachers should develop in their students' positive self-concept towards Mathematics so as to pay more attention to problem solving skills for better performance in the subject.
- 2) Students should be encouraged to match positive self-concept towards Mathematics with high performance in Mathematics.
- 3) Teachers should provide the male and female students the enabling environment to learn and solve mathematical problems cooperatively in order to maintain equity in mathematics performance.

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