SELF-ESTEEM AND SENIOR SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN MATHEMATICS IN BAYELSA STATE, NIGERIA

DR. ABUGE IWANI DORCAS[1]
DR. OMEODU MUVOKE DORIS[2]
Department of Science Education, River State University, Port Harcourt
dididjond@yahoo.co.nz[1], charlesowabat@gmail.com[2]

Abstract

The study was carried out to examine learners' self-esteem and Senior Secondary School Students' Achievement in Mathematics in Bayelsa State, Nigeria. One research question was posed and one corresponding hypothesis was equally formulated. The study adopted an ex-post-facto research design. The population of the study consisted of all the 10,818 S.S.2 students in the eight local government areas in Bayelsa State whereas the sample size of the study was 480 obtained through cluster random sampling techniques. Two instruments were used to obtain data for the study which include Rosenberg's Self-Esteem Scale (RSS) and Mathematics Achievement Test (MAT). The Mathematics Achievement Test was validated by two senior secondary school teachers while the reliability of the instrument was 0.77 obtained using alternate form reliability method. Other instrument was standardized instrument whose validation and reliability have been established over time. Mean, standard deviation and t-test statistics were used to answer the research questions and test the hypothesis respectively. Findings of the study revealed that there is no significant difference in the academic performance of students with high and low self-esteem in mathematics in Bayelsa State secondary schools. The study recommended amongst others that Mathematics teachers should develop a very friendly attitude to students during lesson, this could motivate students who possess low or no interest to mathematics.

Keywords: Self-esteem, Learners, Achievement, Mathematics, Students

Introduction

Mathematics is commonly known as an essential subject that is indispensable in all aspects of human life at different levels. Many often believe that the knowledge of mathematics is the foundation of scientific technological knowledge that is vital to the socio-economic development of nations. Substantiating this credence is the assertion of Kurumeh and Chianson (2011) who opined that for an individual to possess higher order skills and cope with the demands of the present-day workforce and navigate complex world, he/she will have a good knowledge of mathematics. Mathematics is needed for the full comprehension of technological and scientific advances, economic policies and psychological issues. It is regarded as "the mirror of civilization and the emperor of the whole academic world". Opinions from various schools of thought have described mathematics as the cornerstone from which all other subjects like, chemistry, physics, biology, economics can be built. Mathematics forms the bedrock for other disciplines such as engineering, medicine, agriculture, architecture. Progress in the arms industry, space exploration and guided-missile technology would not have been possible without adequate knowledge of mathematics. Also, Boyd and Hipkins (2015) stated that, the knowledge of mathematics is in sport as student feel more engaged and confident being taught in a sporting context of number change and space.

Furthermore, mathematical ability is important for the economic success of the society (Lipnevisch, MacCann, Krunm, Rufus & Robert, 2011). It is important in the scientific and technological development of countries (Enu, Agyman, & Nkun 2015). This is because mathematics skills are essential in understanding other disciplines including engineering, sciences, social sciences and even the arts (Patena & Dinglasan, 2013; Phonapichat, Wongwanich & Sujiva, 2014). Abe and Gbenro (2014) pointed out that mathematics plays a multi-dimensional role in science and technology of which its application outspread to all areas of science and technology as well as business enterprises.

Modern businesses all over the world as well as scientists, transportation, medicine, sports, military science, information and communication facilities are based on science. These are based to a large extent on mathematics. Wilder in Abramoviah Grinspham and Milligan (2019) pointed out that such applications which represent the practical aspect of mathematics in the fulfilling of vital needs of society, are the usefulness of mathematics. Mathematics is the science of quantity and space. It is much more than Arithmetic – the science of numbers and computation. It is not enough with Algebra – the language of symbols and relation. It is far more than Geometry – the study of shape, size and space. It is more than Numerical Trigonometry – which measures distance to stars and analyses oscillation. It involves more than Statistics, - the science of interpreting data and graphs, more than Calculus – the study of change, infinity and unit.

Mathematics prepares pupils for a useful living, such as counting, notation, addition, subtraction, multiplication, division, weighing, measuring, selling, and buying which are simple fundamental processes of life. Every person on finishing secondary education should have clear ideas of numbers and comprehensive notion of both large and units. They should understand the way numbers are applied to measure length, volume, weight, area, density, temperature, speed, acceleration and pressure etc. Estimation and approximation will help check economics in everyday life. Azuka (2012) stated that mathematics is mostly considered as a gizmo that contains the skills for solving real life situations, organizing, simplifying, interpreting duties and performing calculations that are necessary in fields such as science, business and industry for national development. Ngussa and Mbuti (2017) stated that the subject of mathematics became key in school curriculum. In Nigeria, mathematics is being taught at all levels and compulsory in both primary and secondary (Federal Republic of

Nigeria, 2014). Furthermore, Mensah, Okyere & Kuranchie (2013) pointed out that students with high school experiences and feelings towards the learning of mathematics are usually constant and make a long time to change. Ingram stated that students form meaning in their minds about curricular subjects like mathematics even before they learn anything or realise the importance of the subject. Suleman, Asiam and Hassain (2014) and Kpolovie, Joe and Okoto (2014) all concluded that secondary education is the foundation stone for further studies and also for the development of a nation. This conclusion is very true of Nigeria where academic achievement in secondary school Certificate Examination determines who proceeds to higher institutions. Unfortunately, performance of students in mathematics at the end of secondary education has not improved in the past decade.

Having highlighted some of the importance of mathematics, this study focused on learner-related variables and senior secondary school achievement in mathematics in Bayelsa State, Nigeria. These variables include Cognitive styles, Gender, Learner attitude towards mathematics, student interest and self-esteem.

Self-esteem is one of the influential factors of academic achievement documented by Mohammed (2010). Difference in self-esteem can lead to difference in academic achievement. In recent years, the existence of computers in the homes had enabled parents to be committed in their children's education and this has been associated with a positive parental attitude for knowledge and learning of mathematics. Nnadi Dimiwobi, Nwokoye and Osigwe (2016), UNESCO (2004) indicated that young stars from lower economic status are less likely to succeed in school. The social class and economic condition are important factors related to success in school and cannot be ignored (UNESCO 2004). The initial experience that would mould the child's values, aspiration, emotions, interest and attitude are offered by the parent/family (Okeke, 2009). What the child learns at home and how his family motivates him towards education contributes to the child's success in school Udida, Ukwayi and Ogodo (2012). Indeed, family background is the foundation for children's development, as such, family background in terms of socio-economic status SES and educational background play important role in children's educational attainment and social integration (Osunlowe, 2008; Ushie, Emeka, Ononga & Owolabi, 2012). In this case the area of concern is instructional facilities which refer to the physical and social environment that includes facilities, infrastructure, furniture, teachers' support, cooperation and students to students' interaction for effective teaching and learning in the school. Ehiametalor (2011) stated that facilities are those factors which enable production work to achieve the goal of an organization. Olokor (2006) observed that the use of instructional facilities enhances learning experiences and lead to interaction of students and academic achievement in mathematics within the learning environment.

According to Addae-Mensah (2013), results released by WAEC in Biology over the years have consistently indicted that schools that are well-equipped in terms of science laboratories, textbooks and qualified teachers tend to produce better results while poorly equipped schools perform poorly. Their finding shows that schools with adequate instructional materials perform better than those with inadequate instructional materials.

Purpose of the study
The main purpose of this study was to investigate the learner related variables and senior secondary school student's achievement in Mathematics in Bayelsa State Nigeria. In specific terms, the study sought
   1. To determine the difference in the academic achievement of students with high and low self-esteem in mathematics in Bayelsa State.

Research Questions

The underlisted research question was formulated to guide the study.

1. What is the difference in the academic achievement of students with high and low self-esteem in mathematics in Bayelsa State?

Hypothesis

The underlisted null hypothesis was tested at 0.05 level of significance.

1. There is no significant difference in the academic achievement of students with high self-esteem and low self-esteem in mathematics in Bayelsa State.

Methodology

The ex-post –facto research design was adopted in this study because it seeks to investigate an existing phenomenon regarding students' achievement in mathematics. This design was adopted because the researcher didn't manipulate any variables. Neil (2010) stated that ex-post facto study or after-the-fact research is a category of research design in which the investigation starts after the fact has occurred without interference from the researcher. The population of the study consisted of all the 10,818 SS 2 students in the 190 secondary schools of the 8 local government areas in Bayelsa State (Ministry of Education, 2020). The sample size used for the study was 480 senior secondary school 2 students. Cluster random sampling was used to select three secondary schools from each of the eight local government areas in Bayelsa state (24 schools). In each of the 24 selected schools, 20 SS2 students were systematically sampled in such that students whose name appeared at the 20th count in the register were chosen for the study. Hence, the total sample size for the study was 480 students. There are two research instruments used for this study. Rosenberg's Self-Esteem Scale and Mathematics Achievement Test (MAT). Rosenberg's self-esteem scale was used to measure students' level of self-esteem. A 10-item scale that measures global self-worth by measuring both positive and negative feelings about the self. The scale is believed to be uni-dimensional. All items are answered using a 4-point Likert scale format ranging from strongly agree to strongly disagree. Items 2, 5, 6, 8, 9 are reverse scored. Give "Strongly Disagree" 1 point, "Disagree" 2 points, "Agree" 3 points, and "Strongly Agree" 4 points. Sum scores for all ten items. Higher scores indicate higher self-esteem and vice versa (Rosenberg, 1965). Mathematics Achievement Test (MAT) was used to measure the mathematics achievement of the students. MAT was sectioned into two segments, section A was designed to obtain demographic information of the respondents. Information such as age range and gender were obtained. Section two contains 50 multiple choice questions. The scope of the test items comprised all second term SS2 mathematics topics. Each of the test items carries two marks, that is, the totality of the test was 100 marks. The researcher subjected the instrument, MAT to face and content validity. The test instrument was presented to the researcher's supervisor and two other experts who critically examined the instrument for content validity. Other areas like clarity of statements, competence of instruction and its suitability to elicit response were scrutinized by the researcher's supervisor. Alternate form reliability method was used to determine reliability coefficient of the MAT instrument. MAT was administered to fifty (50) students in Bayelsa State. After two weeks the instrument was reshuffled and distractors were changed, then administered to the same group of students. The scores obtained on the two different occasions were correlated using Kudder-Richardson reliability formula (KR21). The reliability index obtained was 0.77. This shows that the instrument was reliable. According to Hickcox (1995), the psychometric ratings generally for self-esteem scale are strong for reliability and good for validity. The administration of the research instrument was carried out by the researcher with the help of two research assistants and the classroom teachers, who retrieved

the questionnaires from the sampled students. Most of the principals granted permission to administer the questionnaire starting from the break period till the end of the day. In each of the selected school questionnaire administration process only took a day. Four hundred and Eighty (480) copies of questionnaire (MAT, RSS) administered, and 100 percent were fully completed and utilized for the study.

For data analysis, the research question was answered using descriptive and inferential statistics. In the descriptive statistics, means ($\overline{X}$), and standard deviation were used. Deductions made from mean scores formed the answers to the research questions. Specifically, Mathematics Achievement Test scores were analyzed using mean and standard deviation. However, the MAT scores were categorized based on the learner related variables that were considered in the study. Since students with field dependent and field independent were identified using MAI, mean and standard deviation scores with those students were computed and presented.

Analysis and Results

Research Question 1: What is the difference in the academic achievement of students with high self-esteem and low self-esteem in mathematics in Bayelsa State?
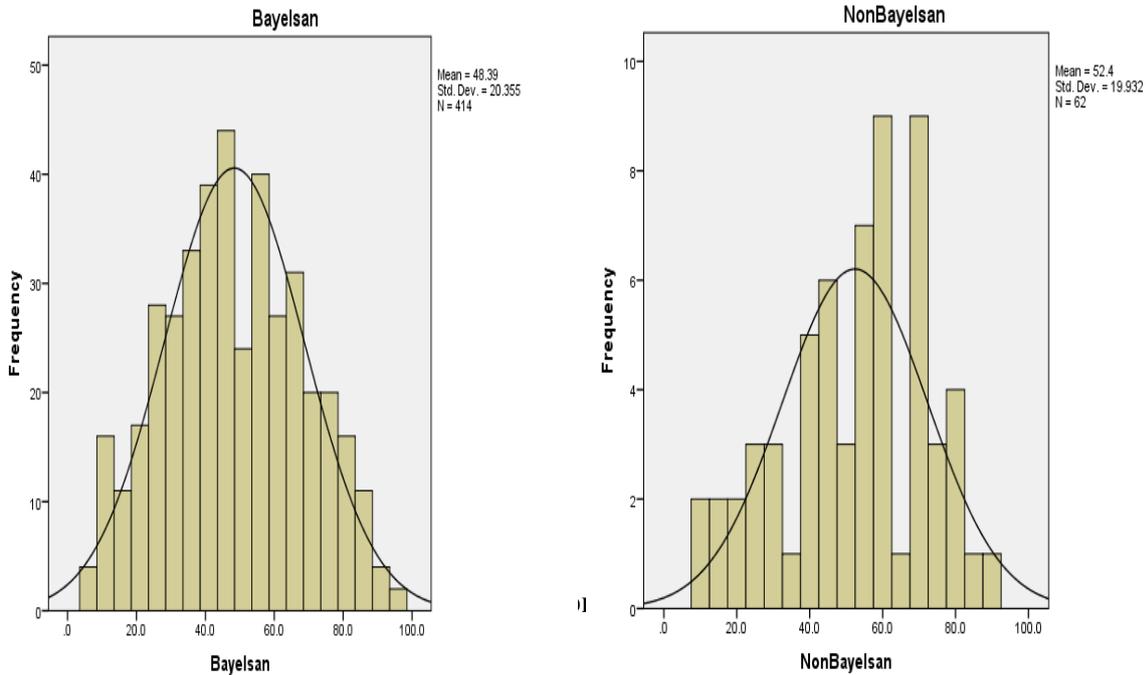
Table 1 Difference in the academic achievement of students with high self-esteem and low self-esteem in mathematics in Bayelsa State

	N	Percent (S ES)	Mean (MAT)	Std. Dev.	Mean Diff.	Skewness
High Self Esteem	64	13.33	52.36	19.68	3.95	-0.381
Low Self Esteem	416	86.67	48.41	20.34		0.057
Total	**480**	**100**				

Field Survey, 2020

Table 1 presents the difference in the mathematics achievement of students with high self-esteem and low self-esteem in senior secondary schools in Bayelsa State. The Self-Esteem scale (SES) shows that 13.33 percent of the respondents have high self-esteem whereas 86.67 percent of the respondents are low esteemed students. In Mathematics Achievement Test (MAT) students with high self-esteem obtained mean score of 52.36 and standard deviation of 19.68. The skewness of the scores (-0.381) indicated that the score curve of the students has long left tail. This indicates that the scores of majorities of the students with high self-esteem cluster within the high values of the curve. On the other hand, students with low self-esteem obtained mean score of 48.41 and standard deviation 20.34. Also, the skewness of the scores (0.057) reported that the distribution of the scores have short right tail in the curve. This indicates that the scores clustered around the less values of the curve. The mean difference obtained (3.95) showed that students with high self-esteem performed better in mathematics than those with low self-esteem.

**Low Self Esteem
students**

H_{01}: There is no significant difference in the academic achievement of students with High and Low self-esteem in mathematics in Bayelsa State secondary schools.

Table 2: z-test Analysis on the Mean Scores of High Esteem and low esteem of students in mathematics in Bayelsa State senior secondary schools

Groups	N	Mean	S.D	D.f	Lev. of Sig.	z-cal	z-crit	p-value	Decision
High Esteem	137	52.36	19.68						
Low Esteem	343	48.41	20.64	478	0.05	1.434	1.96	0.152	Reject Accepted

Research Data Output, 2020

Table 2 presents the z-test analysis on the mean scores of Low Esteem students and high Esteem students in mathematics in Bayelsa State secondary schools. The table revealed that z-cal is 1.434 while the z-crit is 1.98 at 0.05 level of significance. Since z-calculated is less than the z-table (i.e., 1.434> 1.96), the hypothesis is hence accepted. Also, the p-value obtained (0.152) is greater than the level of significance (0.05). This confirmed the acceptance of the null hypothesis. This implies that there is no significant difference in the mean scores of high esteem students and low esteem students in mathematics in Bayelsa State secondary schools.

Discussion of Findings

Table 2 presents the difference in the mathematics achievement of students with low self - esteem and high self-esteem in senior secondary schools in Bayelsa State. The findings showed that 13.33 percent of the respondents are high esteem students whereas 86.67 percent of the respondents are low esteem students. In Mathematics Achievement Test (MAT) high esteem students obtained mean score of 52.36 while low esteem students obtained mean score of 48.41 Also the skewness of the scores (0.057) reported that the distribution of the scores have short right tail in the curve. This indicates that the scores clustered around the less values of the curve. The mean difference obtained (3.95) showed that students with high self-esteem students performed better in mathematics than the low self-esteem Students. On the contrary, no significant difference in the mean score's high self-esteem students and low self-esteem students in mathematics in Bayelsa State secondary schools.

Conclusion

Based on the findings of the study, the researcher concludes as thus

The study has established that students with high self-esteem students performed better in mathematics than the low self-esteem Students. It is also worthy of conclusion that students' self-esteem in mathematics is an essential factor that contributes to students' academic performance.

Recommendations

Based on the conclusions of this study, the following recommendations were made:

1. Mathematics teachers should develop a very friendly attitude to students during lesson, this could motivate students who possess low or no interest to mathematics.
2. Students should develop positive attitude towards mathematics to increase their self-confidence and motivation for greater achievement in the subject.

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