

ACADEMIC OPTIMISM, STUDY HABIT AND MENTAL ABILITY AS PREDATORS TO STUDENTS' ACHIEVEMENT IN SECONDARY SCHOOL MATHEMATICS

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Abstract

This study examined the relationship between students' performance in Mathematics at the secondary school level and academic optimism, study habits, and mental ability. The study used a survey-style descriptive research design. 350 respondents who were randomly chosen from five Senior Secondary Schools in Ijebu-Ode Local Government Area of Ogun State—three public schools and two private schools—made up the sample for this study. Seventy (70) pupils from each of the sampled schools were chosen using a simple random sampling procedure. Students' Academic Optimism, Study Habit, and Mental Ability (SASHMA) questionnaire ($r = 0.896$) and Mathematics Achievement Test ($r = 0.80$) were the two instruments utilized to collect the data. Experts in test and measurement/curriculum research reviewed SASHMA and MAT to verify their face and content validity. The study was guided by three research questions. The data collected was analyzed using multiple regression analysis and Pearson product moment correlation at 0.05 level of significant. The results indicated that academic optimism, study habits, and mental ability together significantly predict students' Mathematics achievement. Based on these findings, it recommended that appropriate modifications be made to the Nigerian educational system to help students develop good study habit.

Keywords: Academic optimism, Mathematics, Mental ability, Study habit, Secondary education.

Introduction

Education is the act or process of learning general knowledge, improving one's capacity for logic and judgment, and generally preparing oneself to make a significant contribution to the advancement of society. Only the use of mathematical skills is capable of achieving all of these (Alao, 2013). Regardless of an individual's educational background or socioeconomic status, knowledge of Mathematics is necessary for daily tasks. Mathematics has many advantages, including the ability to compute as well as, and perhaps more crucially, the ability to analyze critically and rationally. The study of numbers, their operations, relationships, combinations, generalizations, and abstractions, as well as the study of space configurations, their structural measurements, transformations, and generalizations, is known as mathematics. (Franden, 2013). Mathematics is both the queen and the servant of all academic courses because Mathematics is included in all areas of the school curriculum (Franden, 2013). Most disciplines of science and technology have difficulties that can be described using mathematics.

In many professions, a person's ability in Mathematics is required. There is no denying the value of mathematics in both general and situational contexts. (Salman, 2012; Ale, 2012; Agwagah, 2012). The important role of Mathematics in science and technology has long been acknowledged. Mathematics is a cross-cutting subject in post-basic education in Nigeria, hence, the Federal Government's made the subject compulsory in Secondary and primary schools across the country. According to Salau (2013), the relevance of Mathematics originates from the need to fulfill the broad goals of secondary education, which include giving students the skills they need to succeed at higher institutions and in careers related to science and technology. Because Mathematics is the foundation of science and technology, the objective cannot be fulfilled without excelling in the subject. Sadly, throughout the past ten years, students performance in Mathematics at the end of secondary education has not been particularly impressive (Hiebert & Wearne, 2012). Numerous factors have been recognized as potential contributors to students' poor performance in Mathematics. These factors are related to; students, teachers and school. According to studies (Erukudo & Nnaobi, 2002; Achor. 2003; Ifamuyiwa & Kehinde, 2003), some personality traits of students, such as attitudes, study habits, interest, anxiety, gender, cognitive style, self-concept, and achievement motivation, have an impact on students' achievement in mathematics. Furthermore, over the past years, educational researchers have identified a number of teachers' factors that are associated with greater learning. These include pedagogical preparation (Oyewole, 2013), teaching skills (Alebiosu, 2003), and teacher personality traits (Donald, Deborah & Kim, 2010). Additionally, Oyewole (2013) discovered other school characteristics that affect students' achievement in mathematics, including the school's location and physical structure.

Academic optimism (A.O) is a general content idea associated to students' achievement after controlling for socioeconomic background, prior performance, and other demographic factor (Hoy, Tarter, & Woolfolk, 2012). Academic optimism is the favorable atmosphere produced when academic emphasis, group efficacy, and trust operate as a unit in a coordinated manner (Hoy, Tarter& Woolfolk, 2012). Hoy (20014) used a novel academic optimism construct to identify school attributes that go beyond socioeconomic status to account for high school student achievement. According to Seligman (2016), differences in family backgrounds accounted for the majority of the diversity in student achievement and that school features had little bearing on students' academic performance.

In order to explain achievement at the secondary level, Hoy (2014) conducted a study that combined three school characteristics—academic emphasis, collective efficacy, and teacher trust in students and parents—into a single concept called academic optimism. He first proposed the idea that academic optimism was a construct that was developed when academic emphasis, collective efficacy, and teacher trust in students and parents worked together cohesively at the primary school level, and he subsequently demonstrated this at the secondary school level.

The behavior pattern students adopt in the course of their studies that acts as a means of learning is known as Study Habit (S.H.). It is the extent to which the student engages in consistent study behaviors, as demonstrated by proper study routines carried out in a supportive atmosphere. The significance of students' study habits in their academic pursuit was highlighted by a review of the research. Hoy (2014) asserts that many students struggle academically not because they are incapable but rather because they lack the necessary study techniques. Students that struggle in college frequently lack the proper study habits, which has an impact on their academic success.

According to Neisser and Urbina (2012), mental ability (M.A.) refers to a person's capacity for information acquisition, retention, and adaptive application to behavior. According to Olagunju, Duroyilemi & Adesina (2013), mental ability is linked to mental perception, the ability to think abstractly, and the ability to spot patterns in objects. She added that different areas of mathematics and science call for particular skills, including the capacity to form mathematical gestalts, concretize abstract knowledge, gather data and comprehend the characteristics of objects, arrange elements in a visual structure, and determine how to handle given information.

Statement of the problem

Result and data from national examination authorities, such as the West African Examination Council (WAEC) and National Examination Council (NECO) have revealed a constant low performance of students in mathematics, which is depressing. The results of the Senior Secondary Certificate Examination (SSCE) and NECO show that students performed poorly in mathematics, which has continued to cause alarm among educators and other stakeholders across Nigeria. This study investigated factors (Academic Optimism, Study Habit and Mental Ability) which have been found to have implications on academic performance but which their combined and relative effects have not been studied in a single study. The study therefore examined Academic Optimism, Study Habit and Mental Ability as determinants of academic performance of secondary school students in Ogun State.

Research Questions

- Is there any relationship among Academic Optimism (A.O), Study Habit (S.A), and Mental Ability (M.A) and students' academic achievement in Mathematics
- What is the relative contribution of Academic Optimism, Study Habit and Mental Ability on students' academic performance in Mathematics?
- To what extent will Academic Optimism, Study Habit and Mental Ability predict students' academic performance in Mathematics?

Methodology

The study used a survey-type descriptive research design. 350 respondents who were randomly chosen from five senior secondary schools in Ijebu-Ode Local Government Area of Ogun State made up the sample for this study. Seventy (70) students from each school were selected using a simple random sample procedure.

Instruments

Two instruments were used to collect relevant data for the study. These are:

- Students' Academic optimism, Study habit and mental ability (SASHMA) questionnaire.
- Mathematics Achievement Test (MAT)

Students' Academic optimism, Study habit and mental ability (SASHMA) questionnaire

Students' Academic optimism, Study habit and mental ability (SASHMA) questionnaire was adapted from Emenalor (2010). The original questionnaire had thirty (30) items, but the researchers chose twenty-seven (27) of them to create a new instrument that could collect data on students' academic optimism, study habits, and mental ability. Agree, Strongly Agree, Disagree, and Strongly Disagree are the four possible responses. Two separate parts make up the instrument. Part A contains the respondents' biographical information, and Part B is divided into three categories. Nine items made up each of the sections. Each section's items related to a different independent variable.

The instrument's reliability was assessed using the Cronbach alpha reliability coefficient of 0.896. The evaluation of SASHMA's face and content validity was done by professionals in test and measurement/curriculum studies. It was established that the questions were pertinent, clear, specific, and able to elicit the desired responses from the target audience.

Participants in the schools that were selected were given copies of the instruments. The research questions were used to assess the information collected from the respondents. Pearson Product Moment Correlation Coefficient (PPMCC) and Multiple Regression Analysis were used to analyze the data at the 0.05 level of significance.

Mathematics Achievement Test (MAT)

First, a draft of 50 multiple-choice objective items was produced and given to educational evaluation specialists along with the table of specifications for review and counsel. Their recommendations were utilized to change the items for sufficiency, clarity of language, and subject relevancy. The Mathematics Achievement Test consisted of thirty (30) items that made it through the item analysis. The test was meant to assess students' achievement in mathematics. The MAT has four options for every question, each with a letter from A through D. The tests items were written to reflect the knowledge, understanding, and application categories of cognitive activities.

A sample of 120 SSII students from two schools who were not included in the study were given the 30-item MAT. Using the Split half approach, the reliability coefficient for the students' responses was calculated to be 0.80. Two experts in mathematics education reviewed the instrument to verify its face and content validity, and it was decided that the instrument

was pertinent, clear, comprehensive, and able to elicit the required responses from the intended participants.

Results

Descriptive Statistics of the respondents

Table 1: showing the descriptive statistics of the students' factors that this study considered.

	Mean	Std. deviation	N
Academic optimism	2.94	1.332	350
Study habit	2.67	1.193	350
Mental ability	2.46	1.252	350
Students' achievement	2.32	1.083	350

The mean of the four-point structured questionnaire that is coded with strongly agree (SA) as 4 points, agree (AG) as 3 points, disagree (DA) as 2 points, and Strongly Disagree (SD) as 1 point was used to determine the mean benchmark of 2.5. From Table 1, the means of all the items responded are greater than the bench mark mean. This implies that all considered students' factors do affect student' achievement in Mathematics. The table also reveals that academic optimism has highest mean of 2.94 followed by study habit (2.67), then Mental ability (2.46) and achievement with mean value of 2.32 respectively.

Research question one: What are the relationships among academic optimism, study habit, mental ability and students' academic achievement in Mathematics?

Table 2: Correlation Matrix of the Prediction Variables and Criterion Variable

Variables	Academic optimism	Study Habit	Mental ability	Achievement
Academic optimism	1			
Study Habit	0.744	1		
Mental Ability	0.832	0.756	1	
Achievement	0.8226*	0.781*	0.729*	1

*Correlation significant at 0.05 levels.

Table 2 reveals that there is a positive significant relationship between students' factor and students' achievement in Mathematics ($r=0.8226, 0.781$ and 0.729 ; $p < .05$) for academic optimism, study habit, mental ability respectively. This suggests that these students' variables affect how well students succeed in mathematics.

Research Question two: What is the relative contribution of academic optimism, study habit, mental ability to students' academic achievement in Mathematics?

Table 3: Contribution of each of the predictor variables on students' academic achievement in Mathematics

Variables	R	R-Square	Adjusted R-Square	Standard Error of estimate	F	Significant
Academic Optimism	0.412	0.169	0.212	0.786	345.33	0.00*
Study Habit	0.361	0.130	0.387	0.684	765.32	0.00*
Mental Ability	0.339	0.115	0.256	0.634	564.50	0.00*

*Significant at 0.05 level of confidence

Each of the students' factors significantly contributes to the Achievement of students in mathematics. Based on the R-square values, the prediction in descending order of magnitude is as follows: Academic optimism (16.9%), Study Habit (13%) and Mental Ability (11.5%). These percentages indicate the contribution of each of the students' factors to their achievement in Mathematics.

Research Question Three: To what extent will academic optimism, study habit, mental ability s predicts students' academic achievement in Mathematics?

Table 4: Combined influence of predictor on Students' academic performance in Mathematics.

$R = 0.774$, $R - Square = 0.499$ Adjusted $R - Square = 0.87$

Model	Sum of Square	Df	Mean Square	F	Significant
Regression	234.432	4	104.42	276.54	0.00*
Residual	101.097	345	0.432		
Total	335.509	349			

*Significant at 0.05 level of confidence

In table4, the independent predictor Variables (Academic Optimism, Study Habit and Mental Ability) contributed 49.9 % of the total variance in students Mathematics achievement ($R - Square = 0.499$, $p = 0.05$). This percentage is significant. Therefore, the predictor variables listed above are important factors to predict or determine the achievement of students in Mathematics.

Discussion

The results show that academic optimism, study habits, and mental ability put together strongly influenced students' Mathematics achievement. This result supports a study by Vock, Preckel & Holling (2011) that found academic optimism, study habits, and mental ability to be significant predictors of secondary school mathematics students' achievement and retention. The findings support Hoy's (2010) assertion that these characteristics are crucial in understanding mathematical achievement. The findings also show that each of the independent factors significantly contributes to the performance of students in Mathematics. Based on the R-square values, the prediction in descending order of magnitude is as follows: Academic optimism (16%), Study Ability (13%), and mental Ability (11.5%). These percentages show how the predictor variable affected students' Mathematics performance. Further supporting the existing research on the substantial role that academic optimism plays in

students' achievement in school Mathematics is the result that academic optimism significantly predicted students' achievement in Mathematics. The findings confirm the value of creating an environment conducive to learning for all students and for continued research into the effects of academic optimism and each of the school-level characteristics. Additionally, it supports Baiyelo (2006) social cognitive theory as applied to education for academic outcomes. The results of this study support the hypothesis that academic optimism positively affects student academic achievement as revealed by (Achor, 2013). The study that revealed a positive significant relationship between students' factor and students' achievement in Mathematics is also in agreement with that of (Hoy *et al*, 2012) that established that Academic Optimism, Study Habit and Mental Ability are factors that usually strongly contribute to students' achievement in Mathematics.

Conclusion

This study investigated Academic Optimism, Study Habit and Mental Ability as predators to students' achievement in secondary school Mathematics in some selected secondary schools in Ijebu-Ode Local Government Area of Ogun State. The study is in addition to the frontiers of knowledge of students' factors as determinants of students' academic achievement in different school subjects, especially secondary school Mathematics. The results of this study revealed that the three predator variables (academic optimism, study habit and mental ability) jointly significantly predicted students' achievement in Mathematics.

Recommendations

Based on the conclusion of this finding, the following recommendations are made.

- (i) Additional studies could be done to further establish the relationship between academic optimism of students in the schools and their attitude.
- (ii) Necessary measures should be put in place in our educational system in Nigeria to enhance the positive study habit of learners
- (iii) The teachers should focus on the students in order to identify and to know the appropriate time the students are ready to learn.

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