

**ACHIEVEMENT MOTIVATION AS
PREDICTOR OF STUDENTS' ACADEMIC
PERFORMANCE IN MATHEMATICS
SUBJECT: A CASE STUDY OF
SELECTED SECONDARY SCHOOLS IN
OREDO LOCAL GOVERNMENT AREA,
EDO STATE OF NIGERIA**

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Abstract

This study examined the relationship between the achievement motivation of students and their performance in Mathematics subject. Three hundred and twenty-five (325) senior secondary two students in Oredo Local Government Area, Edo State, Nigeria were used for the study. Two research questions were raised and two hypotheses were tested. The study used the adapted version of Mathematics Motivation Questionnaire (MMQ) by Liu and Lin (2010) to collect information from the students. The results show that academic motivation significantly predicts students' performance in Mathematics subject; and there is a significant difference in relationship between academic motivation and academic performance by gender. The study recommends that Mathematics teachers should device modern methods of teaching to arouse students' interest in learning Mathematics.

Keywords: *Achievement Motivation, Mathematics, Performance, and Gender*

Introduction

Mathematics is one of the most essential subjects in secondary schools. The knowledge embedded in this subject is vital to every individual. That is why in the curriculum plans in Nigerian schools; this subject is put to the topmost priority. The importance of Mathematics is obvious in several aspects like in the public examinations, in the fields of engineering, business, technology and administration. Until now, students still have the perception that Mathematics is the most difficult subject. This is proven with the students' lack of confidence in their mathematical answers. They constantly seek for confirmation on their answers from the teachers and parents (Ozmen, 2014). Therefore, a student's readiness is vital for a more effective teaching. Motivation is an individual's internal status toward something. It has power to enhance the strength of the relationship between the input and the output of human behavior. Motivation refers to the reasons for directing behavior towards a particular goal, engaging in a certain activity, or increasing energy and effort to achieve the goal.

The factors that will influence the extents of an individual's motivation include the types and intensity of needs and psychological process (Kleinginna & Kleinginna, 2011). Pintrich and De Groot (2010) proposed a motivation model named as social cognitive model of motivation. In this model, they asserted that the intensity of an individual's motivation will trigger him or her to execute good or bad learning strategies. Both motivation and learning strategies affect student's learning performance (Lee & Anderson, 2013; Lee & Brophy, 2016). The components of motivation in this model are value, expectancy, and affect (Pekrun & Stephens, 2010). The researcher believed that issues of value will be influenced by intrinsic goal orientation, extrinsic goal orientation, and the task value; issues of expectancy would be affected by self-efficacy for learning and performance and control beliefs for learning. Finally, the issues of the affect will be impacted by test anxiety and the level of the learner's self-esteem.

Achievement motivation has been defined as the extent to which individuals differ in their need to strive to attain rewards, such as physical satisfaction, praise from others and feelings of personal mastery (McClelland, 2015). The motivation to achieve, may evidence itself only in behaviour that children value. Individuals' actual achievement behaviour depends not only on their motivation to achieve but also on whether they expect to achieve and whether they fear failure. People are more likely to work hard when they perceive a reasonable chance to succeed than when they perceive a goal to be out of reach (Pekrun & Stephens, 2010). Children's expectations of success can be measured by asking them to predict a certain grade, indicate how sure they are that they can solve a particular problem, and select the hardest task they think they can do from a collection of tasks varying by degree of difficulty (Philips, 2007). Children with high expectation for success on a task usually persist at it longer and perform better than children with low expectations (Eccles, 2008). Researchers like (Carr, Clark & Cheung, 2010) have found that children with high IQs and high expectations of success in school do, in facts get the highest grades.

Children with high IQs and children with low IQs and low expectations receive lower grades than children with low IQs and high expectations. In addition to child rearing practices, reviewed previously, teaching styles and communication pattern affect children's attributions. When teachers are caring and supportive and emphasize the teaching learning process over the performance outcomes, and when they give feedback, students tend to be motivated to achieve and to expect success (Daniels, Kalkman, & McCombs, 2014). Motivation experts have divided this concept into two main categories, namely intrinsic and extrinsic. Components of intrinsic motivation involve internal and personal incentives, creating sufficient attraction for performing

an activity. In contrast, components of extrinsic motivational involve external incentives influencing the individuals to try and achieve an independent goal (Reeve, 2014).

Moreover, Weiner (2016) has presented the most ambitious attribution theory of achievement motivation and emotions. This theory deals with the perceived causes of success and failure, the characteristics of causal thinking, and subsequent emotional experiences in relation to achievement behaviors. Another important leap in motivational research is goal orientation theory. The basic premise of achievement goal orientation theory (Elliot & McGregor, 2011) is that when students engage in academic tasks, they set various personal goals and the types of goals that students adopt can directly influence their academic achievement. Academic achievement refers to particular learning in a particular setting which is defined by examination marks, teachers' given grades and percentiles in academic subjects (Chowdhury & Pati, 2016). School success depends upon the ability of the students to qualify such examinations. The researcher opined that academic performance is indicated by the total marks in Mathematics subject obtained by the students in the final examinations. Subramaniam (2009) examined the motivational effects of interest on student engagement and learning in physical education. The power of situational interest as key motivator in the enhancement of student engagement in meaningful learning process was emphasized. The author posited that situational interest has the potential of influencing interest in learning and predicting future skills intention.

Furthermore, Lee, Chao and Chen (2011) used Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) to ascertain the extent to which teacher's instructional attitude affects student learning outcomes through interaction with either students' interest in learning or the number of their learning hours in Taiwanese vocational colleges. Results revealed that when Taiwanese vocational college students have a satisfied attitude towards their teachers, both interest in learning and learning hours produce positive and significant interactive influence on the learning and their academic achievement. Ayub (2010) investigated the relationship between intrinsic and extrinsic motivation on the academic performance of 200 students (100 male; 100 female) and found gender difference ($t=4.324$, $p < .05$) on both motivation and academic performance. Specifically, the findings revealed that females were more intrinsically motivated, whereas, males were more extrinsically motivated.

Also, Amrai, Motlagh, Zalani and Parhoon (2011) explored the correlation between academic motivation and academic achievement among Tehran University students. Two hundred and fifty-two (252) Tehran University students were required to fill the academic motivation questionnaire. This 43-item questionnaire measured 8 aspects of motivation. Criterion for academic achievement was a mark which students themselves reported. The result of the study indicated positive and significant correlation between Academic Motivation and Academic Achievement. Arbabisarjou¹, Zare, Shahrakipour and Ghoreishinia (2016) investigate the relationship between academic achievement motivation and academic performance among medical students. The results showed that there is a significant relationship between academic achievement motivation and academic performance. This indicates that motivational factors play an important role in academic achievement. Firouznia, Yousefi and Ghassemi (2009) compared the means of two groups of students in academic motivation factors, revealing that boys had higher motivation, effort and competitiveness. The probable reason was that men had heavier responsibilities in the future such as housing, living costs and family or desire of career success. This could also be due to the need to take responsibility among boys in the future and finding a suitable job that requires more effort to be successful in education.

Problem of the Study

It has become increasingly common to find youths who have written their Senior Secondary Certificate Examination (SSCE), conducted by the West African Examination Council (WAEC) but could neither fit into the tertiary institutions of learning nor the labour market in Nigeria because their academic achievement (performance in the SSCE) was poor, not up to the minimum required five credit passes that include English Language and Mathematics for admission. Observations have shown that Mathematics is one of the most important branches in science and had been regarded as a difficult subject for young students by Mathematics teachers, researchers, and educators. Some students cannot score good results in Mathematics because they lack the motivations that will push them in learning Mathematics. The bulk of behaviors indicating the academic motivation involve insisting on doing difficult assignments, hardworking or effort into learning to reach mastery and choosing assignments which need great effort.

Motivation to learn Mathematics at the Senior Secondary School level is one of the most important predictors of Mathematics course success. The most important motivational factor in learning Mathematics subject has been the personality factors such as social status (Hajian & Nasiri, 2015). Moreover, motivational damages on one hand caused a kind of pessimism, anxiety and depression and on the other hand resulted in academic performance failure in students (Askari, 2016). Consistent with these results, Javadi, Adhami and Haghdoost (2016) opined that in order to create academic motivation, education should be presented in appropriate context with desirable facilities concerning the learners' needs. In Nigeria, particularly in Edo State, attention has also been, more or less, paid to this phenomenon. However, a few researchers in the academic field have studied the role of academic motivation in student's performance. Concerning the existing gap in the academic motivation of students, this study examined the relationship between academic motivation and students' performance in Mathematics.

Purpose of the Study

The purpose of the study was to ascertain the relationship between academic motivation and achievement in Mathematics subject. Specifically, the study seeks to:

1. Investigate the relationship between students' academic motivation and their achievement in Mathematics subject.
2. Find out the relationship between academic motivation and achievement of male and female students in Mathematics subject.

Research Questions

To carry out this study, the following research questions were posed;

1. Does academic motivation predict students' achievement in Mathematics subjects?
2. Is there any difference in the relationship between academic motivation and achievement of male and female students in Mathematics subject?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

1. Academic motivation does not significantly predict students' achievement in Mathematics subjects

2. There is no significant difference in the relationship between academic motivation and achievement of male and female students in Mathematics subject.

Method

This research is an ex-post facto design in the sense that the researcher do not have direct control over independent variables because their manifestations have already occurred or because the independent variables were not manipulated. The researcher therefore examined the relationship between motivation (independent variable) of public secondary schools students and their achievement in Mathematics. The target population for the study comprised 3,246 Senior Secondary 2 (SS2) students in Oredo Local Government Area, Edo State, Nigeria. There are 13 public secondary schools in Oredo Local Government Area, Edo State. The study's participants were 325 secondary school students drawn from 4 public secondary schools in Oredo Local Government Area, Edo State. This sample of students was randomly drawn from the selected secondary schools. In carrying out this study, the researcher used Mathematics Motivation Questionnaire (MMQ). The MMQ instrument is an adapted version of Liu and Lin (2010). The Mathematics Motivational Questionnaire (MMQ) has six motivational components, each component has five-item, five point scale and their associated items included intrinsic goal orientation, extrinsic goal orientation, task value, control beliefs for learning, self-efficacy and test anxiety. It consists of four point Likert scale items (strongly disagree (1), disagree (2), agree (3), and strongly agree (4)). The Cronbach alpha coefficient of the Mathematics motivational questionnaire was 0.87. On the basis of the magnitude of the coefficient, the instrument was found to be adequate for testing purposes and was subsequently group administered by the researchers with the assistance of the various class teachers whose classes were used for the study. The completed questionnaires were collected and scored accordingly. Students' Mathematics achievement scores in their third term examination were collected from the Mathematics teachers of the selected schools; the students' scores were standardized by the researchers for uniformity. Data collected on the study were analyzed using inferential statistics which includes; Linear Regression, and Fisher's Z.

Results

Research questions 1 and 2 are hypothesized to become hypotheses 1 and 2 as follows:

Hypothesis One: Academic motivation does not significantly predict students' performance in Mathematics subject.

Table 1: Linear Regression Analysis on the Effect of Academic Motivation on students' Performance in Mathematics Subject

Model		Sum of Squares	df	Mean Square	F	Sig. (2-tailed)
1	Regression	892.718	1	892.718	5.343	0.021
	Residual	53963.762	323	167.070		
	Total	54856.480	324			

$\alpha = 0.05$; $R = 0.128$; $R \text{ Square} = 0.016$

Table 1 shows an F value of 5.343 and a p-value of 0.021. Testing the hypothesis at an alpha level of 0.05, the p-value is less than the alpha level, so, the null hypothesis which states that academic motivation does not significantly predict students' performance in Mathematics subject was rejected. Consequently, academic motivation significantly predicts students' performance in Mathematics subject.

Hypothesis Two: There is no significant difference in the relationship between academic motivation and achievement of male and female students in Mathematics subject.

Table 2: Correlation of Academic Motivation and Academic Performance by Gender

Variable	N	r	Zr	Zcal	Ztab
Male	122	0.886	1.4219	5.36	1.96
Female	203	0.674	0.8107		

$\alpha = 0.05$

The Table 2 above shows the correlation of academic motivation and academic performance by gender. The coefficient values of males and females are 0.886 and 0.674 respectively, testing at an alpha level of 0.05, the calculated Z value of 5.36 is greater than the critical value of 1.96. With this, the null hypothesis was rejected. It is therefore concluded that there is a significant difference in relationship between academic motivation and academic performance of male and female students in Mathematics subject.

Discussion of Findings

Result from hypothesis one revealed that academic motivation significantly predicts students' performance in Mathematics subject. This finding is in agreement with the findings of Lee, Chao and Chen (2011) who found that interest in learning produces positive and significant interactive influence on the learning and academic achievement of students.

Result from hypothesis two revealed that there is a significant difference in relationship between academic motivation and academic performance by gender. Academic motivation may be the cause of the difference in academic achievement. This is consistent with previous research which found that gender difference was significant when the influence of motivation on academic achievement was evaluated in male and female students (Tella, 2007). Hence, it can be said that academic motivation of students play an important role in determining their academic achievement.

Sartawi, Alsaware, Dodeen, Tibi and Alghazo (2016) investigated the extent to which self-efficacy and motivation served as a predictor for Mathematics achievement of fifth grade students in United Arab Emirates (UAE) across gender and achievement levels. Self-efficacy was measured by two scales, which differed in levels of specificity—Category Specific and Task Specific. Motivation was measured through four sub-constructs of motivation—Amotivation, External Regulation, Introjected Regulation, and Intrinsic Motivation. The multiple regression model showed that the six predictors were able to explain together high percentage (32%) of the variance of mathematics achievement. Also the results indicated that the best three predictors were Task Specific, External Regulation, and Intrinsic Regulation. When conducting the regression model across gender, the results showed that 30% of the variance in mathematics achievement was explained by the six predictors for the male group while only 21% of the variance was explained for the female group. The regression model was not invariant across achievement levels. While the model predicted approximately 20% of the variance of mathematics achievement for each of the low and high achieving students, the model was not statistically appropriate for the medium achievement students as it predicted only 5% of the

variance of mathematics achievement. Additionally, the performance of the six predictors varied according to the achievement level.

Conclusion

It could be concluded that school authorities especially counselors and teachers should be aware of the link between academic motivation and academic achievement in students. When the students understand that their failures are a result of effort rather than ability, they will probably exhibit a greater persistence to overcome their failures rather than developing an attitude of helplessness.

Recommendations

Based on the findings, the following recommendations were made:

1. Mathematics teachers should device modern methods of teaching to arouse students' interest in learning Mathematics. Inadequacy and inappropriateness of the instructional methods and materials used for teaching-learning interactions may only handicap academic performance by blocking students' interest in learning and worsening their attitude to school.
2. Teachers and parents should try and build self-confidence in their wards/students as it could boost students' interest in learning and improve their attitude towards school.
3. Students (both males and females) should be adequately motivated in their studies so as to do well not only in examinations but in the setting and attainment of excellent life-long goals.

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