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RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' STUDY HABITS AND ACADEMIC ACHIEVEMENT IN MATHEMATICS IN RIVERS STATE, NIGERIA

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Abstract

This study was titled relationship between university students' study habits and academic achievement in mathematics in Rivers State, Nigeria. Five research questions and five null hypotheses were answered and tested respectively. A sample of 214 Bachelor of Science and Bachelor of Science in Education first year undergraduate students was drawn from a population of 456 students from the three Universities in Rivers State, Nigeria. The correlational survey design was used to conduct the study. A 25-item students' study habit questionnaire and students' mathematics grade inventory were the instruments used to collect. The two instruments were validated and the test retest method was used to establish a reliability coefficient of 0.76 and 0.81 for the questionnaire and mathematics grade inventory respectively. The five study habits investigated were students' attendance to lecture, note taking during lecture, efficiency in delivery of assignment, commitment to personal preparatory studies and use of library facilities for mathematics studies. The linear regression statistical tool was used for the analysis of data. The findings showed that there was a strong and positive relationship between each of the study habits variables considered in this study. The finding also showed that there a significant relationship between each of the students study habits considered in this investigation and the academic achievement of students in mathematics. It was concluded that students' study habit is a very high predictor of students' academic achievement in first year students mathematics courses.

Keywords: Mathematics, Students, Study Habits, Performance, University.

Introduction

The expectation of every student who enrolls in any educational endeavor is to succeed. The indicator of educational success is the attainment of improved and high academic achievement in the students' discipline. Mathematics is one of the disciplines which undergraduate students offer as a discipline in the university. Students are offered admission by universities to either study BSc or BSc.Ed in mathematics programmes. Mathematics is a subject/discipline that has persistently caused so many students pains, phobia and worries. For any student to succeed in mathematical calling, there are certain factors which must come to play. Some of the factors which have contributed to students' academic performance in tertiary institutions are categorized intoteacher factors, student factor, school factor and home factor (George, Zalmon & Okafor, 2020). However, Charles-Ogan and Alamina (2014) opined that the study habits of students are very crucial aspect of learning mathematics successfully. This implies that students' study habit is the pivot of students' academic achievement.

Study habits are the skills or strategies which students engage in the pursuit of their studies in school. As the name indicates, the engagements must be regular and frequent for it to be considered study habits otherwise, it is not considered as study habit. Marc (2011) opined that poor academic performance of students in mathematics is not dissociated from inefficient and ineffective study habits. Study habits therefore serve as the tool for learning mathematics. A student who exhibits a repeatedly pattern of behaviours to learning mathematics is said to have developed a study habits. Hence, study habits should evidence regular patterns which students employ to study tasks. Study habits are all the bahaviours that manifest when a learner is studying (Ajayi, Kassim, Adewale & Abayomi, 2016). The study habits are planned and built over time as against spontaneous study.

It therefore implies that there are good and bad study habits, effective and ineffective study habits and also, rich and poor study habits (Kaur, 2019; Schwekendick, 2020). Charles-Owaba (2019) pointed out that psychologists have proven that study skill is the most powerful variable that affects students' performance in mathematics at all levels of education. The type of study habit which students manifest during study usually indicates the grade of the students in academics. Mathematics is a discipline that deals with numbers, shapes, logic, reasoning, arguments, proofs and computation and therefore has its special skills which must be developed based on its nature and structure. Charles-Ogan (2015) investigated gender influences on study habits of mathematics students' achievement which indicated that both male and female students should be considered vital when dealing with study habits with respect to mathematics achievement. It therefore becomes imperative that the lecturers should find some time to talk about the importance of study habits to the freshers' of mathematics programmes. This is because a well-adjusted student with a good study habit will reach a desirable study goal. It is important to note that study habits can also be categorized into pre-class, in-class and after-class study habits. Each afore-mentioned category has its role to play in the learning of mathematics.

Students need to be determined and disciplined to exhibit a good study habit. This is because good study habits are meant to be sustained. It can only take determination and discipline to sustain good study habits or get rid of bad study habits. Some of the good study habits which students can indulge in are:

1. Attend lectures on a regular basis
2. Participate in mathematics problem-solving during lectures

3. Take personal notes during lectures
4. Prepare a personal planned schedule to study mathematics
5. Make use of library and internet facilities to gain mathematical knowledge
6. Study in a quiet environment
7. Good seating position

Other good study habits are studying in a well-ventilated and well lit up room. Maintenance of a minimum level of average efficiency per day helps to build students study habit in mathematics. Furthermore, good study habit which students can develop is the regulation of sleep and eating habits. A student who is tired, feeling sleepy or overfed will find it difficult to excel in mathematics. Frederick-Jonah and Charles-Owaba (2021) enumerated time management, organization, note taking, reading and critical thinking as some of the study skills that can help students achieve academic excellence in mathematics.

Study habits that can contribute to poor grades of students in mathematics tests or examinations are: procrastination, reading overload, lack of study time plan, not taking notes during mathematics lectures, skipping of mathematics lectures, laziness to study of participate in class assignments, reading mathematics instead of using paper and pencil to solve problems in mathematics and memorization of mathematical facts. Lack of concentration during study hours can also impact negatively on student study of mathematics.

The research finding of Singh (2014) showed that there was a significant relationship between study habits and academic achievement of students. Odiri (2015) carried out a study and found that there was a significant difference between students who exhibited poor study habits and those who exhibited good study habits in mathematics. The research work of Tossavainen, Grohn, Heikkinen, Kaasinen, and Viholainen (2020) also revealed that the level of study habits of university students depicted the level of academic achievement in mathematics.

Statement of the Problem

The variables which are generally known to impact on the academic achievement of students in mathematics are, the nature and structure of mathematics, the quality of mathematics lecturers, method of teaching mathematics, availability and usability of instructional materials to teach mathematics and the extent of mathematics course content coverage. Students are the recipient of teaching and are therefore expected to prove that they have learnt what they are expected to learn. This proof can only be measured by their academic achievement in mathematics. The study habits of students cannot be ruled out in the discussion of academic achievement. Students are expected to exhibit their own quota to mathematics learning by indulging in desirable study habits.

The problem of students' study habits becomes worrisome when the students in question lack the capability to draw a thick line between desirable and undesirable study habits in the study of mathematics in a university community saturated with co-curricular activities. Students always lay blame on lecturers and the difficulty of examination questions when they fall below grade expectations in mathematics without considering the study habits which they exhibited towards the courses they offer. The study habit of students is very crucial to students achievement in mathematics and students need to come to terms with the

various study habits and the relationship that each has with their achievement in mathematics. It is on this note that the researcher sought to investigate the relationship between university students' study habits and academicachievementin mathematics in Rivers State, Nigeria.

Research Questions

1. What relationship exists between students' attendance to lecture and academic achievement in mathematics?
2. What relationship exists between students' note taking during lecture and academic achievementin mathematics?
3. What is the relationship between students' efficiency in delivery of assignment and academic achievementin mathematics?
4. What is the relationship between students' commitment to personal preparatory studies and academic achievementin mathematics?
5. What is the relationship between students' use of library facilities and academic achievementin mathematics?

Hypotheses

H_{O1}: There is no significant relationship between students' attendance to lecture and academic achievementin mathematics.

H_{O2}: There is no significant relationship between students' note taking during lecture and academic achievementin mathematics.

H_{O3}: There is no significant relationship between students' efficiency in delivery of assignment and academic achievementin mathematics.

H_{O4}: There is no significant relationship betweenstudents' commitment to personal preparatory studies and academic achievementin mathematics.

H_{O5}: There is no significant relationshipbetweenstudents' use of library facilities and academic achievementin mathematics.

Methodology

The correlational survey design was employed because the study investigated the relationship between study habit variable and academic performance of University students in mathematics. The population of the study comprised of all the 462 undergraduate BSc and BSc.Ed mathematics students in the three Universities in Rivers State. The Taro Yamane sample size determination method was used to draw a sample of214 undergraduate students in mathematics.

The Taro Yamane Formula:

$$n = \frac{N}{1 + N(e)^2}$$

Where n = the sample size

N = the total population = 462

e = margin error level = 0.05

Substituting we have,

$$n = \frac{462}{1 + 462\,(0.05)^2}$$

$$n = \frac{462}{1 + 462\,(0.05)^2}$$

$$n = \frac{462}{1 + 462\,(.0025)}$$

$$n = \frac{462}{1 + 1.155}$$

$$n = \frac{462}{2.155} = 214.385$$

n = 214 (to the nearest whole number)

Two instruments were used to collect data. They are:

1. Students' Mathematics Study Habits Questionnaire (SMSHQ)
2. Students' Mathematics Grade Inventory (SMGI)

SMSHQ was designed to have two parts captioned Section A and Section B. Section A elicited information that has to do with students' biodata. Section B of SMSHQ was made up of twenty five items which measured students' study habits in mathematics. Items 1 to 5 measured students' attendance to mathematics lectures, items 6 to 10 measured students' involvement in note taking during mathematics lectures, items 11 to 15 measured students' efficiency in delivery of mathematics assignment, items 16 to 20 measured students' commitment to personal preparatory studies in mathematics while items 21 to 25 measured students' use of library facilities to study mathematics. The rating scale of SMSHQ was a modified 4-point Likerts' scale which was designated into Strongly Agree (4 point), Agree (3 point), Disagree (2 point) and Strongly Disagree (1 point).

The second instrument, SMGI was designed to have four columns and two hundred and fourteen rows. The columns were designated into student serial number, name of student, level of student and students' mathematics examination grades in Algebra and Calculus 100-Level courses. The two instruments were validated by three mathematics educators. The reliability of SMSHQ and SMGI were established to be 0.76 and 0.81 respectively using the test retest method. The questionnaires were administered to the sample students on a physical mode with the help of two research assistants. The questionnaires were retrieved from the students immediately they completed the filling of the questionnaire. This method was deemed necessary to avoid the issue of instrument damage or loss. Students' mathematics

grades for Algebra and Calculus courses were collected from the result dossier of the Mathematics Department of each University where the sample students were domiciled. The grades were recorded from the result course score sheets into the SMGI. The data generated from the two instruments were subjected to regression linear analysis at a significant level of 0.05.

Results

Table 1: Summary of linear regression on relationship between students' attendance to mathematics lecture and academic achievement in mathematics

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.620[a]	.348	.346	3.19516

a. Predictors: (Constant), Students' Attendance to Mathematics Lectures

Table 1 showed that the coefficient of relationship between students' attendance to mathematics lectures and achievement in mathematics courses was 0.620 which indicated a strong positive relationship. The R-square value of 0.348 indicated that students' attendance to mathematics lectures had a contribution of about 34.8% to their achievement in mathematics courses.

Table 2: Summary of linear regression on relationship between students' note taking during mathematics lectures and academic achievement in mathematics

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.582[a]	.346	.345	3.19799

a. Predictors: (Constant), Students' Note Taking during Mathematics Lectures

Table 2 showed that the coefficient of relationship between students' note taking during mathematics lectures and achievement in mathematics was 0.582, indicating a strong positive relationship. The R-square value of 0.346 indicated that the notes which students take during mathematics lectures accounted for about 34.6% of their achievement in mathematics.

Table 3: Summary of linear regression on relationship between students' efficiency in delivery of mathematics assignment and academic achievement in mathematics

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.831[a]	.623	.691	2.19765

a. Predictors: (Constant), Students' Efficiency in Delivery of Mathematics Assignment

Table 3 showed that the coefficient of relationship between students' efficiency in delivery of assignments in mathematics and achievement in mathematics was 0.831 indicating a very

strong positive relationship while the R-square value of 0.623 indicated that students' efficiency in delivery of mathematics assignment accounted for about 62.3% of their achievement in mathematics.

Table 4: Summary of linear regression on relationship between students' commitment to personal preparatory studies in mathematics and academic achievement in mathematics

Model Summary

Model	R	R-Square	Adjusted R Square	Std. Error of the Estimate
1	.520[a]	.318	.300	3.30410

a. Predictors: (Constant), Students' Commitment to Personal Preparatory Studies in Mathematics

Table 4 revealed that the coefficient of relationship between students' commitment to personal preparatory studies in mathematics and academic achievement in mathematics was 0.520 indicating a strong positive relationship while the R-square value of 0.318 indicated that the contribution of students' personal preparatory studies to mathematics achievement was about 31.8%.

Table 5: Summary of linear regression on relationship between students' use of library facilities to study mathematics and academic achievement in mathematics

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.672[a]	.436	.438	2.97064

a. Predictors: (Constant), Students' Use of Library Facilities to Study Mathematics

Table 5 showed that the coefficient of relationship between students' use of library facilities to study mathematics and academic achievement in mathematics was 0.672 indicating a very strong positive relationship while the R-square value of 0.436 indicated that students' use of library facilities to study mathematics accounted for about 43.6% of their achievement in mathematics.

Table 6: Summary of linear regression analysis on significant of the relationship between students' attendance to lecture and academic achievement in mathematics

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2093.514	1	2093.514	205.064	.000[b]
	Residual	3930.491	213	10.209		
	Total	6024.005	214			

a. Dependent Variable: Academic Achievement in Mathematics
b. Predictors: (Constant), Students' Attendance to Lecture

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	8.329	1.859		4.480	.000	4.674	11.984
	Students' Attendance to Lecture	1.385	.097	.590	14.320	.000	1.194	1.575

From table 6, it is evident that in Part A, the F-statistic showed that there was a significant relationship between students' attendance to lecture and academic achievement in mathematics $F_{1,213}$=205.064, p<.05. The null hypothesis one was therefore rejected at 0.05 significantlevel. The regression equation y=8.329-1.385x in Part B indicated that an increase in students' attendance to lecture leads to an increase in mathematics achievement. Also, in Part B the column labeled t under students' attendance to lecture (14.320) confirmed the significance of F-statistic with a sig =.000<0.05

Table 7: Summary of linear regression onsignificant of the relationship between students' note taking during lectures and academic achievement in mathematics

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2086.545	1	2086.545	204.020	.000[b]
	Residual	3937.460	213	10.227		
	Total	6024.005	214			

a. Dependent Variable: Academic Achievement in Mathematics
b. Predictors: (Constant), Students' Note Taking during Lectures

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	14.846	1.410		10.531	.000	12.074	17.617
	Students' Note Taking during Class Instruction	1.075	.075	.589	14.284	.000	.927	1.223

From Part A of table 7, the F-statistic showed that a significant relationship exist between students' note taking during mathematics lectures and academic achievement in mathematics $F_{1,213}$=204.020, p<.05. This led to the rejection of H_{O2} at 0.05 significantlevel. The regression equation y=14.846 – 1.075x in Part B indicated that an increase in students' note taking during mathematics lectures led to an increase in achievement in mathematics. Also, in Part B. the column labelled t under students' note taking during mathematics lectures (14.284) confirmed the significance of F-statistic with sig =.000 < 0.05.

Table 8: Summary of linear regression analysis on significant of the relationship between students' efficiency in delivery of mathematics assignment and academic achievement in mathematics

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4164.590	1	4164.590	862.296	.000[b]
	Residual	1859.415	213	4.830		
	Total	6024.005	214			

a. Dependent Variable: Academic Achievement in Mathematics
b. Predictors: (Constant), Students' Efficiency in Delivery of Mathematics Assignment

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	4.597	1.036		4.436	.000	2.559	6.634
	Efficiency in Delivery of Assignment	1.626	.055	.831	29.365	.000	1.517	1.734

From Part A of table 8, the F-statistic shows that a significant relationship exist between students' efficiency in delivery of mathematics assignment and academic achievement in mathematics $F_{1,213}$=862.296, p = .000 < .05. Therefore, H_{O3} was rejected at 0.05 significantlevel. The regression equation y=4.597 - 1.626x in Part B indicated that an increase in students' efficiency in delivery of mathematics assignment will lead to an increase in academic achievement of students in mathematics. Also, in Part B, the column labelled t under students' efficiency in delivery of assignment (29.365) confirmed the significance of F-statistic with Sig .000 <0.05.

Table 9: Summary of regression analysis on the significant of relationship between students' commitment to personal preparatory studies and academic achievement in mathematics

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1820.932	1	1820.932	166.797	.000[b]
	Residual	4203.073	213	10.917		
	Total	6024.005	214			

a. Dependent Variable: Academic Achievement in Mathematics
b. Predictors: (Constant), Students' Commitment to Personal Preparatory Studies

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95% Confidence Interval for B Lower Bound	95% Confidence Interval for B Upper Bound
1	(Constant)	14.961	1.549		9.659	.000	11.916	18.007
	Students' Commitment to Personal Preparatory Studies	1.055	.082	.550	12.915	.000	.894	1.215

From part A of table 9, the F-statistic showed that there is a significant relationship between students' commitment to personal preparatory studies and academic achievement in mathematics $F_{1,213}$=166.797, p = .000 < .05. H_{O9} was therefore rejected at 0.05 significant level. The regression equation y=14.961-1.055x in Part B indicated that an increase in students' commitment to personal preparatory studies leads to an increase in academic achievement in mathematics. Also in part B, the column labeled t under students' commitment to personal preparatory studies (12.915 confirmed the significance of F-statistic with sig. =.000 < 0.05.

Table 10: Summary of regression analysis on significance of the relationship between students' use of library facilities and academic achievement in mathematics

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2626.496	1	2626.496	297.630	.000[b]
	Residual	3397.510	213	8.825		
	Total	6024.005	214			

a. Dependent Variable: Academic Achievement in Mathematics
b. Predictors: (Constant), Students' Use of Library Facilities

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95% Confidence Interval for B Lower Bound	95% Confidence Interval for B Upper Bound
1	(Constant)	10.986	1.391		7.896	.000	8.250	13.721
	Students' Use of Library Facilities	1.287	.075	.660	17.252	.000	1.140	1.434

The F-statistic in Part A showed that there is a significant relationship between students' use of library facilities to study mathematics and academic achievement in mathematics $F_{1,213}$=297.630, p = .000 <.05. H_{O10} was rejected at 0.05 significantlevel. The regression equation y=10.986-1.287x in Part B indicated that an increase in students' use of library facilities led to an increase in academic achievement in mathematics. Part B. of table 10 showed that the column labeled t under students' use of library facilities (17.252) confirmed the significance of F-statistic with sig = .000 < 0.05.

Discussion of Findings

Table 1 showed that the coefficient of relationship between students' attendance to mathematics lectures and achievement in mathematics courses was 0.620 which indicated a strong positive relationship. The result also showed that students' attendance to mathematics lectures contributed 34.8% to their achievement in mathematics. From the finding, it was revealed that there was a significant relationship between students' attendance to lecture and academic achievement in mathematics. This finding implies that an increase in students' attendance to mathematics lectures also leads to an increase in mathematics achievement while a decrease in lecture attendance also leads to a concomitant decrease in mathematics achievement. This is in agreement with the findings of Odiri (2015) which revealed that there was a significant relationship between students' study habits and mathematics achievement. This finding is also in agreement with the finding of Olatunji (2019) which revealed that class attendance by students has a positive relationship with academic performance of students.

Table 2 showed that the coefficient of relationship between students' note taking during mathematics lectures and achievement in mathematics was 0.582, indicating a strong positive relationship. The result also showed that the taking of notes by students during mathematics lectures contributed 34.6% to their achievement in mathematics. When subjected to statistical test, it was found that there was a significant relationship between students' note taking during mathematics lectures and academic achievement in mathematics. Note taking is very important during mathematics lectures. The note taking from the lecturer and the personal note taking of the students are all vital. The mathematics content written down during lectures serve as a study material for the students after lecture hours. This finding is not in agreement with the research findings of Villa and Sebastian (2021) which revealed that there was a significant relationship between achievement motivation and achievement motivation was the only predictor of mathematics achievement as against study habit and internal locus of control.

Table 3 showed that the coefficient of relationship between students' efficiency in delivery of assignments in mathematics and achievement in mathematics was 0.831 indicating a very strong positive relationship. The result also showed that the efficiency of students in the delivery of mathematics assignments accounted for about 62.3% of their achievement in mathematics. Subjecting this finding statistical test revealed that a significant relationship exist between students' efficiency in delivery of mathematics assignment and academic achievement in mathematics. It is obvious from this finding that when students are efficient in the delivery of all mathematics assignment given to them by the course lecturers, it helps to improve their understanding of the course contents thereby improving their achievement in mathematics.

Table 4 revealed that the coefficient of relationship between students' commitment to personal preparatory studies in mathematics and academic achievement in mathematics was 0.520 indicating a strong positive relationship. Personal preparatory towards mathematics learning helps students to understand mathematical concepts and processes more. This is because the mathematics contents that students learn during lecture hours are not enough to make them have mastery of the taught contents. Students therefore need to plan and study personally in a bid to prepare themselves for higher mathematical tasks.

Table 5 showed that the coefficient of relationship between students' use of library facilities to study mathematics and academic achievement in mathematics was 0.672 indicating a very strong positive relationship while the R-square value of 0.436 indicated that students' use of library facilities to study mathematics accounted for about 43.6% of their achievement in

mathematics. There are many mathematics hard copies and e-books in the University libraries. Moreso, there are some mathematics departments that have libraries. The sole function of library is to assist students to have access to and study books which they may not have personally. The library is a serene place for students to study mathematics before lecture or after lecture hours. This may indicate why the finding of this study revealed a 43.6% contribution of students' use of library facilities to their achievement in mathematics. This finding is in agreement with the findings of Udoka (2018) whose result showed that the effective use of library facilities by students had a strong and positive relationship with their achievement in science subjects.

Conclusion

Based on the results revealed in this study, it was concluded that the study habits which students exhibit with respect to their area of specialization (mathematics) has a concomitant relationship with their academic performance in mathematics. Study habits such as attendance to mathematics lectures, note taking during mathematics lectures, efficiency in delivery of mathematics assignment by students, students' commitment to personal studies and use of library facilities to study all had a strong and positive relationship with academic performance in mathematicsand with a statistical significance.

Recommendations

The recommendations made based on the findings of this study were as follows:

1. Students should be encouraged to have a high percentage of attendance to mathematics lectures.
2. Mathematics lecturers should encourage students to actively take notes during mathematics lectures.
3. Students should be made to know the consequences of not been efficient in delivery of mathematics assignment to their programme.
4. Students should constantly be guided and counseled on the gain or commitment to personal preparatory studies in mathematics.
5. Seminars should be organized to train students on how to use the facilities gainfully with respect to their areas of specializations.

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