GENDER AND STUDY HABITS AS DETERMINANTS OF STUDENTS' ACHIEVEMENT IN MATHEMATICS

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Abstract

Mathematics is studied for its utilitarian role in human endeavours. It is a school subject which is dreaded by many and studied with high level of anxiety. Research have shown that there are many factors that determine the achievement of learners in Mathematics. Male and female also differ in their study habits and how it affects their achievements. Hence, this research investigated if the study habits of the students and their gender can determine their achievement when taken together, and when examined across gender. Two research questions and 2 hypotheses guided the study. The study is a descriptive survey. The population comprised all the 103,447 senior secondary school students in Kwara state. Six senior secondary schools were purposively selected from two randomly selected Local Government areas in the state. The schools comprised 4 coeducational and 2 single sex (one male and one female) schools. A sample of 300 SSII students (150 males and 150 females) were randomly selected from the six secondary schools. Two validated instruments used for data collection were: MAT (r = .86; KR20) and SSHQ (r= .8). The findings showed that there is significant relationship between frequencies of the study of Mathematics per week and achievement. The frequency of Study of Mathematics can predict Mathematics achievement. There was no significant difference in Mathematics achievement between male and female students. There was significant difference in Mathematics achievement based on level of study habits. It was recommended that the male stereotyping should be discouraged in Mathematics study. Both genders should be given exactly the same opportunities and challenges in Mathematics class. Male and Female students need to compete, collaborate and gain from each other in Mathematics teaching and learning. Schools should accept the responsibility of teaching students' good study habits.

Keyword: Gender, Study habits, Mathematics achievement, Performance and Determinants.

Introduction

The study on gender is a sensitive area in research which commands the attention of the world, especially, the western world. The comparison of male child education with the female child education is an important area of study to the world since late 20th century. Gender refers to the psychological and sociological dimensions attributable to being a male or female. The learning ability of the students depends on previous experiences, personality make up and social support (Ewumi, 2012). The social support has to do with parental involvement, teachers' support and peer influence. Where there is effective teaching, parental encouragement and a healthy peer influence, students learn Mathematics better. The gender of a learner influences how he feels thinks and acts. At the adolescence school stage, the child learns through mentorship, imitations and their behaviours are influenced by what they see in family circuit, school environment and their peers. Research on gender and study habits has been reported interestingly with different findings generally and to specifically Mathematics.

Olunloyo (2010) and Kolawole (2004) among other authors described Mathematics as the king and queen of sciences and a bedrock to many professions. As important as Mathematics is to science and technology, researchers like Uwameh (2011) reported that there is often a continual report of poor performances of students in this subject at most certificate examination levels. A good number of factors can affect students' performance in Mathematics. Among them are; teaching method adopted by the teacher, learners' attitude, textbooks, environment, parental involvement and background, student's ability the study habit of the learner. On the other hand, the study habit of the learners are influenced by the study environment, place of study, time and goal of the learner. Acido (2010) is of the opinion that students with positively and favourably disposed study habit will also have a positive attitude to learning and good performance. The indices for measuring study habits of students include scheduled time to study, place to study, organized activities, good parental support, decisions and priorities of activities. All these indices are found at varying degrees across gender. Male and female students respond to these factors differently.

Study habits has been defined by Fleming (2013) as the practices and behaviours put up by the students before, during and after period of learning. Such factors include when, how, where to study and duration of study. It includes the practice which the learner puts up in readiness for assessment such as test, assignment or examination. It should be noted however that study habits

have a variety of factors. These in addition to what Flemings (2013) said should include preferred environment, length of period used in study. Ossai (2012) added that age and gender are also a factor in study habits. He reported that female students fair better in concentration, listening, note-taking, reading and schedule of time.

Research findings by Osa-Edoh and Alutu (2012) on study habits of students and performance reported a high positive correlation between students' study habit and academic performance. Nonis and Hudson (2010) reported that study time as a factor under study habit had a direct positive impact on students' performance while some other factors have a negative direct impact on performance. Salami (2013), found out that female students are more committed than male in the areas of frequency of class attendance, seeking extra academic supports. Females were also reported for adherence to time-table, more attention to assignment than male, longer time of study than male counterpart.

Due to mixed reports on gender and study habits of students on performance in Mathematics, this study sees the need to examine gender and study habits as determinants of students' performance in Mathematics. The objectives of this study are to *determine: the study habits used by students'; whether there is gender difference in study habits and their achievement; the relationship between the students' study habit and achievement in Mathematics.* It is hoped that the study will add to repertoire of literature and concern of study habits in determining students' performance across gender. Thus, enabling appropriate counselling need for each sex.

Research Questions

1: What is the study habits of Mathematics students?

2: How does the students study habit relate to their achievement in Mathematics?

Research Hypotheses

HO1:- There is no significant difference in male and female Mathematics achievement

H02: There is no significant difference in the study habit of students based on gender.

Methodology: The study is a descriptive survey of *ex-post-facto* type which adapts descriptive and correlational design in order to describe the effect of study habits of students' on Mathematics and determine the relationship that exists between students' achievement in Mathematics and their study habits. Out of the 300 public secondary schools in Kwara State, six secondary schools were randomly selected from two randomly selected Local Government (Irepodun and Isin) Areas of the state. Based on the report of Federal Ministry of Education (2016), the population of Senior Secondary School Students in Kwara State was 103,447. To maintain the balance between male and female participant equal sampling technique was employed to select sample subjects. In view of the respondents, 150 males and 150 females' students of SS II were selected randomly.

The Students' Study Habit Questionnaire (SSHQ) and Mathematics Achievement Test (MAT) were used for data collection. SSHQ was a structured Likert Scale type questionnaire comprising of 40 items with closed ended questions was used for students' self-rating exercise, in order to describe their study habit in Mathematics. The instruments were given to experts in Mathematics education for validation. The reliability of the instruments was calculated as 0.8, Items included in MAT covers areas of Mathematics like set theory, number system, logarithms, algebras, and commercial & financial Mathematics. A multiple-choice of 50 items were developed and pilot tested. Experts in Mathematics education were used for validation of the 50 items in MAT. Kuder Richardson (KR_20) was used for the reliability, r= 0.86. The data obtained from the respondents (students) were analyzed using percentages and Pearson Product Moment Correlation statistics for the research questions while hypothesis were tested at 0.05 significant level with t-tests.

Results:

Research question 1: What is the study habit of Mathematics students?

The pattern of students' study habits was measured under 3 perspectives, viz; a) in terms of frequency of study per week, b) in terms of duration of each time of study and c) in terms of time of the day for the study of Mathematics. The result on the pattern of study habits of students in Mathematics is shown in table 1 below.

Table 1: The Study Habits of Students in Mathematics

	Dimension of measure		Frequency	%
1	Frequency of study per week	Study daily	92	30.7
		5 days per week	102	34.0
		4 days per week	93	31.0
		2 days a week	13	4.3
2	Duration of each study time	30 minutes	69	23.0
		30 – 60 minutes	122	40.7
		60min- 1hr 30min.	69	23
		Above 1hr 30min.	40	13.3
3	Time of the day for study of mathematics.	Any time	101	33.7
		Morning	144	48.0
		Afternoon	41	13.7
		Night	14	4.7

The frequency of study habits is the measure of rate of weekly study. This refers to the number of days the student commits into the study of Mathematics. Those who study Mathematics in the 5 days of the week are in the majority, with 102 (34.0%) students. Those who study their Mathematics in 4 days of the week, 93 (31.0%) followed this. Closely rated to this are those who study Mathematics on daily basis. They are 92 (30.7). Lastly, are those who study Mathematics in about 2 days in a week. These are 13 (4.3). In a summary, more than 64% studied Mathematics at least 5 days of the week. This is clear evidence that the students frequently study Mathematics during the week. Mathematics as a subject demands frequent study in order to enhance understanding and good memory.

Second dimension of the study of pattern of study habits of students in Mathematics is the duration of each time they commit to the study. This is a measure of how long the student can sit down as a period of his own study. The time measures between 30 minutes and above 1 hour 30 minutes. 122 (40.7) students claimed that they spend between 30 minutes to 1 hour at once while

they study. Those who spent 30 minutes and those who spent between 1 hour to 1½ hour have the same number 69 (23.0). Those who spend above 1½ hour at a stretch are 40 (13.3%). This shows a measure of attention span they have. This measures also depend on the frequency of study. Those who study above 1½ hour at once may not likely spend many days of the week. The duration may also be determined by the number subjects the student have to study in a week.

Time of the day is the third dimension used to measure the pattern of study habits of students in Mathematics. This is measured in 4 categories; any time of the day 101 (33.7%). Morning 144 (48.0%), afternoon 41 (13.7%) and night 14 (4.7%). This distribution of study pattern shows that the students study mostly in the morning. This should be interesting, and one needs to know the possibility of studying in the morning even when they had to prepare for the school. Moreover, this is not contrary to the number of responses claimed night 14 (4.7%). In the sense that if they do not so much study at night they could perhaps wake early to do so. Thus, the result may have justify early to bed is early to rise. They sleep early and wake up early to study Mathematics. Some researchers have opined that morning hours are appropriate for the study of an abstract subject like Mathematics and for subjects that require deep thinking. This is one of the reasons why school systems always have it on the timetable in the morning.

Research question 2: How does the students study habit relate to their achievement in Mathematics?

Table 2: Correlation between Study Habit Factors and Students' Achievement in Mathematics

Study Habit Factors		Frequency study per week	Duration of each time	Time of the day in study of Mathematics	Mathematics Achievement
Frequency study per week	Pearson correlation	1			
	Sig. (2.talled)				
	N	300			
Duration of each time	Pearson correlation	0.146*	1		
	Sig. (2.talled)	0.011			
	N	300	300		
Time of the day in the study of Mathematics	Pearson correlation	0.085	0.093	1	
	Sig. (2.talled)	0.143	0.109		
	N	300	300	300	
Mathematics Achievement	Pearson correlation	0.142*	-0.004	0.085	1
	Sig. (2.talled)	0.014	0.947	0.143	
	N	300	300	300	300

Correlation is significant at the 0.05 alpha levels (2-talled)

The study habit in relation to students' achievement in Mathematics is measured in terms of time or period the student commits to the study of Mathematics. The relationship between the study habit of students' and Mathematics achievement is shown with the Pearson Product Moment Correlation in table 2. The table shows a significant relationship (correlation) between frequency of studying Mathematics per week and achievement, $r = 0.142$, $p = 0.014 < 0.05$. There is also a significant relationship between frequency of study per week and duration of each time.

Table 3: Multiple Regression of Variables

R	R square	Adjusted R square	Std. Error of the Estimate
0.173[a]	0.030	0.020	4.559

The factor under study habit is measured in relation with time student use in their studies. The 3 factors considered here are the frequency of days committed to the study per week, the length of time committed to study at each time of study and the period of the day used in studying. To measure how these factors in study habit relate with achievement, a multiple regression analysis was run as shown in table 3. The table shows that, the study habit factors have a positive relationship with Mathematics achievement (R = 0.173). The R square is 0.030 and the adjusted R square = 0.020. These study habit factors contributed 2% to the relationship in Mathematics achievement under this study.

Table 4: Regression ANOVA of Study Habit on students' Achievement in Mathematics

Model	Sum of square	Df	Mean square	F	Sig
Regression	188.667	3	62.889	3.026	0.030
Residual	6150.920	296	20.780		
Total	6339.587	299			

The regression ANOVA table shows the joint contribution of their study habit factors to Mathematics; it also measures the significant of the joint contribution. As presented in the table, F (3, 299) = 3.026 ($p < 0.05$). The p value of F ratio is 0.030. This is less than 0.05. This indicates that the study habit factors jointly made significant contribution to Mathematics achievement. It therefore becomes necessary to investigate which of the factors made relative significant contribution to students' achievement in Mathematics. Thus study habits is a determinant of students' achievement in Mathematics. It is further necessary to know which aspect of the study habit made a significant contribution adequately enough as to determine achievement in Mathematics.

Table 5: Relative Contributions of Study Habit Factors to Mathematics Achievement

	Unstandardized coefficient		Standardized	t	Sig
	B	Std Error	Beta		
Constant	19.930	1.164		17.120	0.000
Frequency of study per week	0.789	0.302	0.152	2.615	0.009
Duration of each time	0.044	0.278	0.009	0.160	0.873
Time of the day in study Mathematics	0.553	0.329	0.097	1.680	0.094

The table 5 above shows the relative contribution of the study habit factors as measured by the Beta weight. The relative contribution of frequency of each time per week is ß=0.152; p = .009, duration or length of time, ß=.009; p=.873 and time of the day in studying Mathematics is ß = 0.097 (p = 0.094). The frequency of study per week makes significant contribution in the relationship. Thus, frequency of study is statistically significant to the contribution of study habits in determining students' achievement in Mathematics. All other variables in the study are germane and contributed although not statistically significant under this study, frequency of study will predict Mathematics achievement.

HO1:- There is no significant difference in male and female Mathematics achievement.

Table 6: t-Test showing Difference of Mathematics Achievement between Male and Female Students

	SEX	N	Mean	Std Dev	Std Error of Mean	T	Df	Sig
SCOPE	Male	150	23.19	4.999	0.408	1.762	298	0.790
	Female	150	22.26	4.138	0.338			

Table 6 above, shows the result of test of significant difference between male and female achievement in Mathematics. There are the same number of male and female (150) for each set. The mean score of the male students is 23.19 while that of female students is 22.26. This shows that the mean score of male students is higher than that of the female students. Hence male students perform better than the female counterpart. The t value equals to 1.762 is not significant (p = 0.790 > 0.05) at 0.05

alpha level. This shows that there is no significant mean different in Mathematics achievement between male and female. We do not reject the null hypothesis. It is concluded that there is no significant difference in Mathematics achievement between male students and female students.

H02: There is no significant difference in the study habit of students based on gender.

Table 7: Study Habits of Students Based on their Gender

	SEX	N	Mean	Std. Dev	Std. Error of Mean	T	Df	Sig
STUDY	Male	150	43.353	6.2628	.51136			
HABIT	Female	150	42.447	6.5431	.53424	1.225	2.98	.221

Table 7 above is the presentation of the result of analysis of difference between students' study habit of Mathematics and their gender. There were 300 students with equal number (150) each. The mean estimate of male student is 43.353 while that of female is 42.447. They both maintain close dispersion (standard deviations) from their means. The mean difference has t = 1.225. This t value is not significant at 0.05 degree of freedom, p = .221 > .05. The hypothesis is not rejected. Hence, there is no significant difference in the study habit of male and female students.

Further Discussion

There are several variables that one can consider under study habits of the students. The aspect considered in this study is on use of time. The study found and reported the frequency at which students study Mathematics per week, duration of each study time and period of the day they study Mathematics. The result showed that more than 60% of the student studied Mathematics at least 5 times of the week. This is adjudged reasonable enough. Mathematics is taken in five periods in a week in most schools. It is an indication that the student barely in each day would study Mathematics, do exercises and assignments. In addition, more than 30% spent at least 11/2 hours in each time they studied. At the same time, 48% make use of morning for their study time. An all, it is logical to say that the students have a good study habit with respect to time and commitment.

The result of the findings indicates that a significant positive relationship exist between students study habits and their achievement in Mathematics. The study habit has a significant relationship on the level of performance. This is also in agreement with the findings of Amatobi and Amatobi (2020)

who reported that there is no significant difference between male and female achievement in Mathematics.

This shows that the male and the female students have closely related habit of studying Mathematics. This finding is against the reports of Ossai (2012) and Salami (2013) who reported that female students are better than males in study habit. The result of this study indicates that males and females performance in Mathematics are differently affected by their study habits. These findings justify the advocacy of Hussain (2006) that there should be inclusion of study habits in the curriculum, for both males and females. A positive significant relationship between the three time-variables is in indication that they are paramount to

Conclusion

The study showed that there is a positive relationship between student's study habit and Mathematics achievement. The frequency of study, the duration of study and the time of the day the students put into the study of Mathematics jointly contribute significantly to student achievement in Mathematics. The frequency of study has the greatest contribution to students' achievement in Mathematics. The students in most cases prefer studying Mathematics in the morning than any other time of the day. It is the frequency at which the students study Mathematics and not the length of time or the period of the day that matters in Mathematics achievement. There is no significant difference in the ways boys and girls study Mathematics. Similarly, there is no significant difference in male and female achievement in Mathematics

It is a majority believe that Mathematics is male domain, in this study it is clear that when male and female have the same study habit they are likely to have the same level of achievement. If female students are given the same opportunity to study, they can perform as male counterpart.

Recommendations: Based on these findings, the following recommendations were made:

1. Students should be counselled and encouraged to spend more time and in a regular and consistent manner to the study of Mathematics in order to excel. A good study habit should be encouraged among the students. Students should be made aware that frequent study of Mathematics will enhance their achievement.

2. Contrary to the opinion that Mathematics is male domain, with this result, it should be made known to the female students that they can compete favourably with male students.
3. Both male and female students should be encouraged to study Mathematics at the time when they feel it is appropriate for them.
4. Stakeholders particularly parents and teachers should not exalt male students above their female counterpart or consider Mathematics as male domain. They should put in place a favourable atmosphere where male and female can compete.

References

Acido, M. (2010). High School Students Reasoning Skills and Their Study Habits and Attitude Towards Learning Alipats:*A Journal of Basic Education, 4, 108–117. Retrieved at* ***http://journals.upd.edu.ph/index.php/ali/article/viewfile/1769/1685***

Amatobi,V.E. & Amatobi, D. A. (2020). The influences of gender and attitude differences to students' achievement in mathematics in Nigerian secondary schools: a case study of Comprehensive secondary school Amurie-Omanze in South Eastern Nigeria. *American Journal of Research Communication. 8(2) 1-8 www.usa-journals.com*

Federal Ministry of Education (2016) Total Senior Secondary School Enrolment (Public and Private) by State, class and gender 2015/2016. *Nigeria Digest of Education Statistics* download 27/3/2022 at https://education.gov.ng/nigeria-digest-of-education-statistics/

Fleming G. (2013). Study habits and attitude. The road to academic success. www.openscience-repository.com/study-habits-and-attitudes.

Hussain, A. (2006). Effect of Guidance Services on Study Attitudes, Study Habits and Academic Achievement of Secondary School Students, *Bulletin of Education and Research.* 28(1), 35-45. Lock, C. (1981). Study skills (Indiana, Kappa Delta Publication, West Lafayette 1(5) 7 – 26.

Kolawole E.B. (2004). The effects of home background and peer group on secondary school student's Academic Performance in Mathematics and chemistry in Ekiti State, Nigeria. *Journal of Contemporary issues in Education,* 2(1), 198.

Nonis, S. and Hudson, G. (2010). Academic performance of college students: Influence of time spent studying and working. *Journal of Education for Business*. 85(4), 229-238

Olunloyo, V. O. (2010). The pre-eminence of Mathematics and its infinite applications. Distinguished Lecture. *A Public Lecture*, University of Ibadan.

Osa-Edoh, G. and Alutu, A. (2012). A survey of students study habits in selected secondary schools: Implication for counseling. *Current Research Journal of Social Sciences*, Vol. 4 (3), 228-234.

Ossai M.C. (2012) Age and Gender Differences in study Habit: A framework for proactive counseling Against low Academic Achievement. *Journal of Education and Social Research . 2(3), 67-73*.

Salami, C.G.E (2013).Gender academic achievement in Delta State University, Asaba . *Universal Journal of Education and General studies. 2(3), 118-126.*

Uwameh, M. A. (2011). A survey of factors responsible for students' poor performance in Mathematics in Senior Secondary School Certificate examination in Idah Local Government Area of Kogi State. Unpublished Project work, University of Benin.