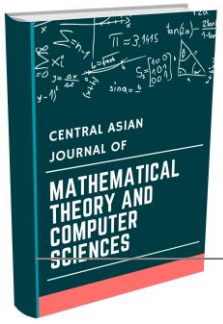

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STUDY HABIT AND MENTAL ABILITY AS PREDICTORS OF STUDENTS' ACADEMIC ACHIEVEMENT IN ALGEBRA

Patrick Friday Obot

Department of Curriculum and Instruction (Mathematics), University of Houston, USA

Abstract

This paper examined study habit and mental ability as predictors of students' Mathematics Achievement. The study reviewed related and relevant literatures which gave the study a strong empirical and theoretical footing. Students' Study Habit and Mental Ability Questionnaire (SSHMAQ) was developed as a research instrument together with an Algebra Achievement Test (AAT). The data were analyzed using chi-square and Pearson Product Moment Correlation (PPMC) and all the hypotheses were tested at 0.05 level of significance. The results showed that independent variables (study habit and mental ability) have positive correlation with students' achievement in algebra. However, the findings of the study also revealed that each of the independent factors positively significantly correlated to the achievement of students in Algebra. Based on the Chi-square values, 0.781 showed positive correlation between study habit and student achievement in Algebra likewise 0.823* of chi-square value which showed a positive correlation between mental ability and student's achievement in Algebra. Recommendations and suggestions on effective strategies towards the learning algebra were offered based on the outcome of the survey conducted on the participants.*

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Introduction

The study habits of students vary from one student to the other and from one place to another. It is an important aspect of learning because students' achievement in schools depends greatly on their study habits. It plays a vital role in reflecting the standard of education and the students' achievement in mathematics. The students cannot be expected to learn everything needed about the subject matter from their teachers directly from classroom alone, it is the combination of both the classroom learning and out of classroom learning that make up students study habits.

A student who cultivates certain study habit will perform differently from a student who has another set of study habit. It is believed that students who lack effective and efficient means of studying would be building on shaking foundation and consequently have weak foundation. The teachers teach all the students collectively but all the students do not have the same grades, here we have slow learners and fast learners in mathematics. With these the teachers get puzzled with the sight of such situations and then try or push too much (Onoshakpokaiye, 2022).

Mathematics is a subject that is related to other school subject in areas like numbers and numeration, variation, graph, fractions, logarithms and indices, algebraic process, solutions of equations and also in areas and volumes of plane and solid shapes. It was because of this that Awokoya (2014) agreed in a research that we live in a world where science and technology have become an integral part of the world culture. He concluded that for any nation to be relevant, it must not overlook the importance of mathematics in her education system.

The general belief or assumption is that students who exercise good study habits are likely to excel than those with poor study habits. According to Sharma (2023, p.67)" academic performance is a necessary evil because one kind of ability is rewarded economically and socially more than others." This necessitates concern over factors that are commonly linked with academic achievement. There is tremendous pressure on students to earn good grades because academic achievement is assumed to possess predictive value and used to bar the gate or to open between the primary, secondary schools and university, and also between the university and certain social professions (Sharma, 2023, p.69).

Parents desire that their children climb the ladder of performance to the highest level as much as possible. The desire puts a lot of pressure on students, teachers, schools and the entire education system in general, making it to revolve around the academic achievement of students. The importance of academic achievement has raised several queries among educational researchers, such as why does one student perform better than another? Unfortunately, "explanations provided however correct they may be, in their own way, have placed a lopsided view of the problem and merely scratched its surface" (Buba, Sule and Alabi, 2021, p.6)."

Students' poor achievement in mathematics, both at internal and external examinations have never ceased to be a matter of concern to government, administrators and the general public, that is why beams of search and research light continue flash down on the subject. Now, it is not enough for us as academicians to keep talking and writing about the sad and grave nature of the problems. Academic optimism is the positive environment created when academic emphasis, collective efficacy and trust work together in a unified fashion (Ugbah and Ega, 2020).

Onoshakpokaiye (2022) states that mental ability is related to mental perception, capacity for abstract thinking and capacity to recognize patterns in things. It is also related to sequence and order in nature, and ability to do logic and interpret data, culminating in the production of useful information. She further affirmed that different topics in Science and Mathematics require different abilities such as: Ability to form Mathematical gestalts, ability to perceive formalized mathematical materials; ability to relate general modes of description to concrete situations; ability to get information and understand the properties of given objects; ability to draw conclusions to reason logically; ability to perceive a problem as a generation of a problem already solved.

Generally, the term "mental abilities" refers to the performance measured by tests that determine spatial awareness, perceptual speed, number sense, vocabulary, memory, inductive reasoning, and so forth (Onoshakpokaiye, 2022). In infancy, preliminary stages of mental abilities may be determined with developmental tests (e.g., Adu-Gyamfi, Ampiah & Agyei, 2018), and intelligence tests are used from childhood onwards.

It is against this backdrop that this study seeks to examine the varying study habits of students and their mental abilities as predictors of their academic performance in mathematics with special attention on

algebra, for avoidance of awkwardness and promote efficiency in the research process. The scope of the study covers selected public secondary schools in Ogun State, South West Nigeria.

Statement of the Problem

A student who develops and utilizes good study habits is likely to perform better in his studies when compared with the one who has bad study habits. Thus, study habit is very instrumental to the academic success of every student at all levels. However, one wonders the extent to which students in recent times develop and use their study habits; as most of the students in secondary school hardly know how to study. This position is further stressed by Kaziba and Umar (2020), who are of the opinion that the most common challenge to the success of students in all ramifications is lack of effective study habits and mental ability to affect their performance in mathematics. Most students do not have study plan to guide their studies and mental capacity to retain what have taught. Some hardly attend classes, do their homework and prepare for their exams etc. This may be connected to the recent abysmal performance of students in both internal and external mathematics exams.

Therefore, the study focused on study habit and mental ability as predictors of student's mathematics achievement with special attention to algebra. The problem in the study of algebra among high school students is that many students struggle to understand and apply the fundamental concepts and principles of algebra. This leads to a lack of proficiency in solving algebraic equations, manipulating algebraic expressions, and effectively applying algebraic reasoning skills in problem-solving situations. Consequently, these difficulties hinder their overall mathematical comprehension and future success in advanced mathematics courses and real-world applications that heavily rely on algebraic skills.

Purpose of the Study

The study investigates student's study habit and mental ability as predictors of students' academic achievement in algebra in secondary schools. Specifically, this study seeks to ascertain relationship between study habits, mental ability and secondary school students' academic achievement in algebra.

Review of Related Literature

Mathematics is one of the compulsory subject students learn at primary and post-primary education levels in Nigeria. Baiyelo (2010) stated that, these seem to be a growing nexus between mathematics education as the foundation of science and technology and a nation's ability to become prosperous and economically independent. The study of mathematics should aid individuals in ordering, organizing and investigating their environment hence its knowledge should be made to attain more generality of the people (Baez, 2012).

Students' achievement in mathematics varies across different nations due to the difference in the adopted teaching strategy as well as students study habits. Some students' get disgusted with methods that render them inactive in the learning process as well as fancy text backs that have not much for students' selection of exercises, activity and less engendering towards a richer understanding of the subject matter. Studies revealed that major contextual influences such as students' environment, family and historical and cultural contexts influence their learning (Acido, 2010).

There is tremendous pressure on students to earn good grades because academic achievement is assumed to possess predictive value and used to bar the gate or to open between the primary, secondary schools and university, and also between the university and certain social professions (Sharma, 2023, p.69). The general belief is that students who exercise good study habits are likely to excel than those with poor study habits. According to Sharma (2023, p.67) academic performance is a necessary evil because one kind of ability is rewarded economically and socially more than others. This necessitates concern over factors that are commonly linked with academic achievement.

Parents desire that their children climb the ladder of performance to the highest level as much as possible. The desire puts a lot of pressure on students, teachers, schools and the entire education system in general, making it to revolve around the academic achievement of students. The importance of academic

achievement has raised several queries among educational researchers, such as why does one student perform better than another? Unfortunately, studies that directly examine the relationship between study habits and mental abilities with respect to students' achievement in algebra are scarcely available. The interplay between study habits, mental ability, and academic achievement in algebra among secondary school students is a complex relationship that warrants critical investigation. The reviewed literature suggests a positive relationship between effective study habits, high mental ability, and improved academic performance in Mathematics, without specifying the particular areas of mathematics where such improvements are recorded from.

Additionally, the reciprocal influence between study habits and mental ability highlights the importance of integrating both components in educational interventions for enhancing students' mathematics achievement. That is why this research is needed to explore the specific mechanisms that connect study habits, mental ability, and academic achievement in algebra, as well as to identify effective strategies for fostering their development.

Studies on Students' Study habits

A study by Kaziba and Umar (2020) found that students usually do not devote sufficient time to their studies and seldom have proper study habits. Efficient study habits are associated with a favorable attitude toward learning in general. He beliefs in the value of intellectual pursuits and in the importance of education are positively related to academic achievement. An important aspect of a student's attitude toward education is the value he sees in what he has to learn.

In the study of Sarwar (2019), it was discovered that a significant relationship between student attitudes and academic achievement exists. High-achieving students had a more positive attitude toward study in that they detected and reacted positively to the favorable aspects of the situation they found themselves in, while the low-achieving students tended to be fault-finders, reacting to the negative aspects of study such as distractions and minor annoyances.

Study habits is a well-planned and deliberate pattern of study, which has attained a form of consistency on the part of the students towards understanding academic subjects and passing examination Therefore, study can be interpreted as a planned program of subject matter master. According to Abayomi and Asari, (2017), the chief purposes of study are: to acquire knowledge and habits which will be useful in meeting new situations, interpreting ideas, making judgments creating new ideas and to perfect skills. Therefore, successful achievement in any form of academic activity is based upon study, interpretation and application. Everyone has different study habits. All often, students perform poorly in school simply because they lack good study habits. In many cases, students do not know where to begin. Those students in high school who succeed especially well usually study alone and follow a study technique that has been worked out by them and that incorporates desirable procedures. Good health, sufficient sleep, appropriate exercise and nutritious diet are essential to achievement of good study results. Study conditions that are unfavorable include inadequate lighting, extremes of temperatures, humidity, poor posture, subnormal physical conditions and emotional disturbance.

Study habits vary from student to student. Some habits are considered to be more desirable than others from the point of view of academic achievement (Abayomi and Asari, 2017, p.261). Educational Psychology states that study requires a purpose and what one learns as a result of study depends largely upon the degree to which one succeeds in achieving that aim or purpose (Ohuche, 2020, p.95). Psychology and the Teacher assert that we talk about forming bad or good habits in many everyday activities in both social and educational contexts. We behave, by and large, in characteristic ways because we have discovered through experience that some responses are more effective than others.

Studies on Mental Ability

To measure mental ability, it is necessary to know what is being measured and to define a set of units to differentiate between people. Following the approach of psychologists, we conceive of mental ability in

terms of the capacity to retain ideas and comprehend and solve abstract problems. While there is no perfect empirical counterpart to this theoretical definition, there are several measures on which differential performance is partly determined by the theoretical construct. The more that differences on the measure are determined by mental ability, the more appropriate is the measure as a proxy. The two most obvious measures, which should be related to mental ability, are rank in high school class and scores on a standardized set of tests. Although both measures are related to mental ability, one may be a better proxy than the other. Standardized tests can be divided into IQ and aptitude (achievement) tests. In principle, aptitude tests measure the amount of knowledge or skill acquired (primarily in school) in particular subjects. IQ tests are thought of as measuring general inborn ability, which does not depend upon previous schooling (or the factors noted above). However, a substantial body of evidence suggests that most IQ tests depend, among other things, on years of schooling, quality of schooling, and cultural background.

Students' Academic Achievement

Academic achievement of students has been the subject of intensive research over the past years. It has become an issue of standards and quality in education as judged from the achievement of students in national licensure and board examinations. Unfortunately, students' achievement in this all-important subject has been consistently poor especially in the Senior Secondary Certificate Examination (SSCE) organized by the West African Examination Council (WAEC) and the National Examination Council (NECO). SSCE is the examination written by Nigerian students at the end of their secondary education and it is used to measure the extent of knowledge and skills the students have acquired at that level of education.

Research Questions

1. What is the relative contribution of study habit, mental ability to students' academic achievement in Algebra?
2. To what extent will study habit and mental ability predict students' academic achievement in algebra?

Research Hypothesis

$H0_1$: There is no significant contribution of student study habit and mental ability to students' academic achievement in algebra

$H0_2$: There is no significant effect of Study Habit and Mental Ability as predictors of students' achievement in algebra

Methodology

The study adopted descriptive survey research design. The choice of this design was informed by the fact that a group of respondents considered to be the representative of the larger population were used for the study. The sample of the study comprised of 350 secondary school students drawn from 35 secondary schools within the study area. A simple random sampling technique of probability sampling approach was used. In order to gather valid data from the respondents (secondary school students), a close-ended questionnaire designed in a four-point likert rating scale of strongly agreed, agreed, disagreed and strongly disagreed was employed by the researcher. Also, an instrument called Algebraic Achievement Test (AAT) was used to test mental ability of the student on the subject.

Result and Discussion

Hypothesis One (H_0): There is no significant contribution of student study habit and mental ability to students' academic achievement in Algebra

Hypothesis One (H_1): There is significant contribution of student study habit and mental ability to students' academic achievement in Algebra.

To test hypothesis one, chi-square statistical technique was used at 0.05 level of significance and 1 degree of freedom.

Table 1: Contribution of contribution of student study habit and mental ability to students' academic achievement in Algebra

Type	*Value*	*df*	*Level of Sig.*
Calculated Chi-sqaure	67.36	1	0.05
Tabulated Chi-sqaure	3.84	-	

From Table 1, the calculated chi-square value is 67.36 while the table chi-square value is 3.84. Chi-square decision rule states that if the calculated Chi-square value is greater than the table value, the null hypothesis should be rejected while accepting the alternative hypothesis. Thus, since the calculated chi-square value of 67.36 is greater than the table chi-square value of 3.84, the null hypothesis which states that there is no significant contribution of study habits and mental ability of the students on their academic achievement is rejected while upholding the alternative hypothesis which states that there is significant contribution of study habits and mental ability of the students on their academic achievement. This therefore, implies that there is significant relationship between study habits and mental ability on students' academic achievement in algebra. That is, when students develop and utilize good study habits, they tend to perform better in algebra compared to students who study without plan or with bad study habits.

Hypothesis Two (H_0): There is no significant effect of Study Habit and Mental Ability as predictors to students' achievement in algebra

Hypothesis Two (H_a): There is significant effect of Study Habit and Mental Ability as predictors to students' achievement in algebra

Table 2: Effect of Study Habit and Mental Ability as predictors of students' achievement in

Correlation Matrix of the Independent Variables and Dependent Variable

Variables	*Academic Achievement*	*Study Habit*	*Mental ability*
Academic Achievement	1		
Study Habit	0.781*	1	
Mental Ability	0.823*	0.729*	1

Table 2 reveals that there is positive significant relationship between students' achievement in algebra and Study Habit ($r = 0.781^{*}\ and\ p < .05$). There also significant correlation between students' academic achievement and Mental ability ($r = 0.823^{*}\ and\ p < .05$). There is correlation between Student study habit and mental ability ($r = 0.729^{*}\ and\ p < .05$). This implies that the achievement of Students in algebra depends on some of this students' factor.

Discussion

This research work sought to investigate whether there is significant contribution of the student's study habits and mental ability students' academic achievement in algebra. Result obtained showed that there is significant contribution of study habits and mental ability on students' achievement in algebra. The finding of the study corroborates with the opinion of Hoy (2012), who observes that good study habits will contribute to a successful academic future as well as leads to good grades while good grades in turn lead to admissions into better colleges and universities, possibly with a scholarship thrown in. Developing good study habits according to Hoy (2012) is very crucial for every student irrespective of his level of education; as it boosts students' ability to be self-disciplined, self-directed and ultimately successful in their degree programs.

He further maintained that effective study habits and ability to retain what was being taught are important part of the learning process. Having effective study habits according to Hoy (2012) as quoted earlier, creates a more efficient academic environment. Planning your study schedule in advance and faithfully sticking to it saves time. When students have good study habits, they would tend to be less stressed. Students who are anxious on exam day are typically the procrastinators who came unprepared. Students who organize their

lives and stick to their established study schedules are confident and relaxed at test-taking time. Ashish (2013) and Abid (2016) admit that if students must ensure academic success throughout the entire year, it is important to ditch bad study habits and mental capability.

The results also indicated that mental ability of students is great parameter to measure what they have retained over the time which predicted their academic achievement. Based on the outcome of the survey conducted on the participants, the study hereby suggests the following effective strategies for learning algebra:

1. **Starting with the basics:** The students should make sure they have a solid understanding of the foundational concepts in algebra, such as order of operations, equations, and variables.
2. **Regular Practice**: Algebra is a skill that improves with practice. Therefore, students should set aside dedicated time to work on algebra problems every day or every few days.
3. **Problems should be broken down:** When faced with a complex algebraic problem, students are advised to break it down into smaller parts. This helps to simplify and understand the problem better.
4. **Seeking help when needed**: Students are encouraged not to be afraid to ask for help. They should reach out to teachers, classmates, or online resources when they are struggling with a specific concept or problem.
5. **The use of visual aids and manipulatives:** Algebra can sometimes be abstract, so using visual aids like diagrams, graphs, and manipulatives can help make concepts more concrete and easier to understand.
6. **Working with a study group**: Collaborating with others who are also learning algebra can be helpful. Students can discuss problems, share insights, and learn from each other.
7. **Practising both solving equations and word problems:** Algebra encompasses both solving equations and word problems. Students must make sure to practise both types of problems to develop a well-rounded understanding.
8. **Reviewing and revising:** Regularly review and revise previous topics to reinforce your learning. This helps you retain information and build upon previous knowledge.
9. **The use of online resources and tutorials:** There are many online resources, tutorials, and videos available that can provide additional explanations and practice problems.
10. **The need to stay positive and persistent:** Algebra can be challenging, but maintaining a positive mindset and persevering through difficulties will help every student overcome obstacles and continue learning Algebra.

Conclusion

This study investigated students' study habit and mental ability as predictors of their achievement in algebra in selected secondary schools in Ogun State, South West Nigeria. The study is an 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 two variables (study habit and mental ability) jointly significantly predicted students' achievement in algebra. Finally, based on the findings from the questionnaire responses, the study suggested and recommended practical strategies for the secondary school students to overcome the challenges of learning algebra as an aspect of Mathematics.

References

1. Abayomi, J. K. and Asari, O. J. (2017) "Study Patterns and Academic Achievement in Mathematics: Evidence from Nigerian Secondary School Students", *European Journal of Educational Studies*, 20(1), pp. 39-52

2. Abid H, C (2016) Effects of guidance services on study attitudes, study habits and academic achievement of secondary schools students. Bulletin of Education and Research 28(1) Pp35-45
3. 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*
4. Adedayo. H. (2017). The Challenge of Mathematics Education in Contemporary Nigeria. First Distinguished Lecture, FCE (Technical), Akoka, Lagos.
5. Adeyemo, B. J. (2015) Effects of study habit modification and test taking strategies on academic performance of secondary schools students in Nigeria. Unpublished PhD thesis University of Ado-Ekiti Ekiti State Nigeria
6. Adu-Gyamfi, K., Ampiah, J., & Agyei, D. (2018). Teachers' Problems of Teaching Of Oxidation-Reduction Reactions In High Schools. *European Journal of Education Studies, 3(1), pp. 20-34*.
7. Agba R (2013). Why Students must Develop Study Habits. Calabar: Rixmas Publishing Company.
8. Alao, I. F. (2017). *Psychological Perspective of education, psychology and education series*. Ibadan: Revelation Books, Dugbe. Pp. 48, 91
9. Alig-Mielcarek, J., & Hoy, W. K. (2015). Instructional leadership: Its nature, meaning, and influence. In W. K. Hoy & C. Miskel (Eds.), *Educational Leadership and Reform* (29 – 54).Greenwich, CT: Information Age.
10. Aremu, A. and Tella, A. (2019). The relationship between gender, age, mental ability, anxiety, Mathematics self-efficacy and achievement in Mathematics. Cypriot Journal of Educational Science, 4:113-124.
11. Ashish R (2013). Study Habits for Students: Bad Ones to Avoid, Good Ones to Achieve Success. www.education.wisc .education/soe/newsevent
12. Awofala, A.A. (2011), Why Communication is Important: A Rationale for the Centrality of the Study of Communication. *Journal of the Association for Communication Administration* Pp1-15
13. Awokoya, S.O.(2014) "Relevance of science teaching to the needs of the community", *Journal of STAN, 14*(13), pp.57-68.
14. Baez, A.V. (2012). Innovation in Science Education Paris: UNESCO Press, 1-20.
15. Baiyelo, T.D. (2020). Difficulties in Communicating Science. A Review of studies in pupils understanding of aspects of Mathematics. *Journal of Research in Mathematics Science, 3(2), (12-134).*
16. Beam, C. R., Turkheimer, E., Finkel, D., Levine, M. E., Zandi, E., Guterbock, T. M., … Davis, D. W. (2020). Midlife study of the Louisville twins: Connecting cognitive development to biological and cognitive aging. Behavior Genetics, 50(2), 73–83. https://doi.org/10.1007/s10519-019-09983-6
17. Buba S. J, Sule B. T. and Alabi, O. A. (2021) "Challenges and Prospects of Teaching and Learning Mathematics in Nigerian Secondary Schools", *International Journal of Educational Research and Reviews,* 3(3), pp. 121-132.
18. Deary, I. J. (2014). The stability of intelligence from childhood to old age. Current Directions in Psychological Science, 23(4), 239–245. https://doi.org/10.1177/ 0963721414536905
19. Deary, I. J., Hill, W. D., & Gale, C. R. (2021). Intelligence, health and death. Nature Human Behaviour, 5(4), 416–430. https://doi.org/10.1038/s41562-021-01078-9
20. Gbore, I. (2016) Cognitive entry characteristics of study habits and self-concept as predictor of academic performance of university undergraduate Students in south west Nigeria. Unpublished PhD thesis University of Ado-Ekiti Ekiti state Nigeria

21. Grace, F (2013). Would Group Study Improve Your Grades? Retrieved from www.about.com. 11/3/2016.

22. Hoy, W. (2012). School characteristics that make a difference for the achievement of all students. *Journal of Educational Administration, 50*(1), 76-97. doi: 10.1108/ 09578231211196078.

23. John, M. (2010). Students Study Habits and Styles. Retrieved fromwww.worldwidelearn.com. 12/3/2023

24. Kaziba A. M and Umar, K. (2020) "The Effect of Study Habits on Students' Achievement in Mathematics", *Journal of Education and Practice,* 9(4), pp.176-193.

25. Ohuche, R O (2020): Explore Mathematics with your children. Onitsha, summers education.

26. Okereke, S. C. (2016) Effects of prior knowledge of implications of mathematical tasks /concepts to career types and gender on students' achievement, interest and retention. In U. Nzewi (Ed) *STAN procedures of the 47th Annual conference,* 253-259.

27. Onoshakpokaiye, O. E. (2022) "The Learning skills: an educational implication on students' performance in secondary school mathematics", *Mathematics Education Journal* 5(2), pp.115-123.

28. Sarwar, P. U. (2019) "Students' Study Habits and Mathematics Achievement: A Comparative Study in Nigeria" *International Journal of Learning, Teaching and Educational Research,* 8(1), pp. 303-333.

29. Sharma, W. P. (2023) "Enhancing the standard of teaching and learning via qualitative school-based supervision in Nigerian secondary schools", *Educational Research and Reviews* 12(10), pp. 583-588.

30. Ugbah, A. B. and Ega, J. U. (2020) "Enhancing Mathematics Teaching and Learning in Nigerian Secondary Schools through the Use of Digital Technologies", *Journal of Education and Practice,* 8(1), pp. 302-320.