CORRELATION BETWEEN STUDENTS' ATTITUDES AND MATHEMATICS LEARNING ACHIEVEMENTS OF HIGH SCHOOL STUDENTS IN YOBE, NIGERIA

Saleh Musa[1*], Wasilatu Saleh Mamudo[2], Babagana Butu Mohammed[3], James Hirhyel Audu[4]

[1,2,3,4]Department of Education, Faculty of Arts and Education, Yobe State University Damaturu, Nigeria

Corresponding author: musaa099@gmail.com

Article Info	ABSTRACT
	Attitudes can affect the overall behavior of students in the learning process. This study aims to investigate the correlation between students' attitudes and mathematics learning achievements among 367 senior secondary school students in Yobe state, Nigeria. A correlational design was used in the study. The research instruments used were questionnaires designed by the researchers to elicit responses from the students and end-of-term 3rd term mathematics examination scores of the students. The respondents were measured with a relevant standardized scale with Cronbach alpha reliability of 0.83. The data obtained was analyzed using Pearson Product Moment Correlation and t-test for independent sample. The result showed that there was a significant correlation between students' attitudes and mathematics learning achievements of high school students'. In addition, there was a significant difference between male and female students' attitudes toward mathematics learning achievements of high school students. Thus, it can be concluded that students' attitudes and learning achievement in mathematics are positively related. Female students are more prone to math phobia. In view of these findings, it is recommended that teachers should be wary of student attitudes toward learning mathematics and ensure that mathematics phobias are drastically minimized.

HUBUNGAN ANTARA SIKAP DAN PRESTASI BELAJAR MATEMATIKA SISWA SMA DI YOBE, NIGERIA

	ABSTRAK
	Sikap dapat menentukan secara keseluruhan apa yang dilakukan siswa dalam proses belajarnya. Penelitian ini bertujuan untuk menyelidiki mempelajari hubungan antara sikap siswa dan prestasi belajar matematika pada 367 siswa SMA di negara bagian Yobe, Nigeria. Desain korelasional digunakan dalam penelitian ini. Instrumen penelitian yang digunakan adalah angket yang dirancang untuk memperoleh respon dari siswa dan nilai ujian akhir matematika semester 3 siswa. Respon diukur dengan skala standar yang relevan dengan reliabilitas Alpha Cronbach sebesar 0,83. Data yang diperoleh dianalisis menggunakan Pearson Product Moment Correlation dan uji-t untuk sampel independen. Hasil penelitian ini terdapat hubungan yang signifikan antara sikap siswa dengan prestasi belajar matematika siswa SMA. Selain itu, terdapat perbedaan yang signifikan antara sikap siswa laki-laki dan perempuan terhadap prestasi belajar matematika.

Dengan demikian dapat disimpulkan bahwa sikap dan prestasi belajar matematika siswa berhubungan positif. Siswa perempuan lebih rentan terhadap fobia matematika. Berdasarkan temuan ini, disarankan agar guru waspada terhadap sikap siswa dalam pembelajaran matematika dan memastikan bahwa ketakutan terhadap matematika dapat diminimalisir.

1. INTRODUCTION

Nigeria as a nation wants to transform from analog to digital world which is characterized by increasing in discoveries, inventions and innovations. This development paved the way for the integration of science and technology into the school's curriculum. The science that is formal involve a systematic study which allows the students to experience the richness and excitement as they engage in enquiry, critical thinking and the demonstration of skills. Consequently, the harmonious interplay of science, technology and society is the spring board for sustainable development which equally facilitates and enhances industrial and technological progress among the people and within the nation.

Nigeria came up with National Policy on Education (NPE) into existence in 1977 and it conceived education as an instrument for national development and social changes for maximizing the creative potentials and skills of the individuals for self-fulfillment and general development of the society [1]. While adopting education as an instrument for national development and social change, the federal government gave premium on the importance of science and mathematics, technology, humanities and business studies. The policy states that such subjects should continue to be taught in integrated approach in the schools to trained and promote manpower in applied sciences, technology, technical and vocational job-specification skills for self-reliance, agricultural, industrial and economic development [1].

In Nigeria and other country of the world, the importance of mathematics to society is always reflected in its educational sector. The subject is very valuable because it is the foundation upon which the bulk of present day technological break-through is built [2]. It is then of importance since Nigeria is one of the countries now in a hurry to join in the technological race in which all advanced nations of the world are currently participating. To meet up with the technological age of the 21st century, therefore the country need to improve its mathematics education of the citizens. However, the development of mathematical knowledge and abilities, form an integral part of the set of educational goals that is to be associated with science education that is why mathematics has played a very important part in all science education program right from primary, secondary and to tertiary institutions. [3] Hypothesized that students' involvement primarily influences attributes and behaviours, which in turn affect mathematics achievement. Similarly, [4] indicated that students' participation is a statistically significant predictor of their mathematical achievement and also promoted positive behaviours and emotional development.

The compulsory cross-cutting subjects for senior secondary schools as stated in the National Policy on Education 2013 include General Mathematics in which every student is required to pass at credit level for admission into tertiary institution for all programmes of study. It is on this note that Salman cited in [5] explained that Mathematics is a precursor of scientific discoveries and inventions. It is the foundation for any meaningful scientific endeavour and any nation that must develop in science and technology must have a strong mathematical foundation for its youths. [6] noted that students' attitude in

its many and varied ways is a vital parameter for increasing their mathematics achievement. In terms of curriculum relevance, Mathematics is compulsory at the secondary school level and a prerequisite for moving from one level of education to another [5].

A good and sound background in Mathematics is an essential requirement for the study of all science, technology and social science based courses. In Nigeria it is one of the requirements by the Unified Tertiary and Matriculation Examination (UTME) for admission in to institution of higher learning. Research has shown that successful students have strong academic support from their self-efficacy and parental motivation [7]. Demonstrated that students whose parents were highly educated and exposed to mathematics before in their lives tend to show more success in mathematics than their peers whose parents were less educated and not being exposed to mathematics [8]. [9] Explained that Mathematics is one of the significant subjects that is taken very seriously in the education system, irrespective of country or level of education. It has been described as a model of thinking which encourages learners to observe, reflect and reason logically about a problem and in communicating ideas, making it the central intellectual discipline and a vital tool in science, commerce and technology [5]. Therefore, Rich learning environments that incorporate meaningful mathematical attitude and experiences are associated with higher achievement and genuine home/school collaboration has also been found to lift children's achievement significantly [10], [11].

Attitudes are significant in determining the overall what the students do about learning process. It is the human expression that has three interrelated components which include beliefs, feelings, and behavior. According to [12] attitude is an acquired state which is attained through expression in person life. Attitude manifest in the students' scholastic performance, it is determine through the process of interpretation; the direction of the inferred is subsequently determined whether it is positive or negative on the basis of the total factors surrounding the objects and the context. Attitude therefore, is a significant factor needed for an importance output of any task [13]. Students' characteristic such as attitude plays important role in student achievement in all subjects. Furthermore, [14] explained that attitude as a mental or neutral state of readiness organized through learning experience; exert a direct or dynamic influence upon individual responses to all objects and situations. Moreover, attitude can be seen as a predisposition or tendency to respond positively or negatively towards a certain idea, object, person or situation [15]. Allpor's, Describe this underlying psychological idea as the most distinguishing and vital concept in contemporary social psychology [16]. Attitude are based on some combination of cognitive, behavioural and affective influence and are measures by self-report scales such as semantic differential, where a person rates the target on bipolar evaluative dimension such as how good/bad or favour/unfavourable something is [15]. However, researchers have found it useful to assess attitude on dimension such as how consistent the basis of the attitude is and how confident people are in validity of their attitude. Negative attitudes and behavior have adverse effect on the learning outcomes, more especially in mathematics. Students who have phobia about the subject, developed low self-esteem, withdrawal, aggression, and feel embraced about the subject and in return it affect affects their learning achievement [17].

Learning achievement is a concept that has always being used interchangeably with some concepts such as scholastic achievements, learning outcomes, academic achievement, academic performance and academic success among others [18]. Define academic performance as simply referred to how much a student has achieved after a course of instructional training in a school setting [19]. In other words, it refers to the

extent to which instructional objectives are said to achieve by students/learners after teaching and learning processes took place. Learning achievement is the cumulative/aggregate performance of students in the homework, assignment, tests and examinations he/she has undergoes after a period of time. See academic performance as excellence in academic disciplines, in class as well as extracurricular activities [20]. Learning Performance is an outcome of education, the extent to which a student, teacher or institution has achieved their educational goals. It can also be defined as an excellent in supporting, behavior, confidence, communication, skills, punctuality, assertiveness, arts and culture Etc. Furthermore, it could be described as the total academic achievements which are normally used to pronounce the failure or success of students. Academic performance is commonly measured by examinations continuous assessment but there is no general agreement on how it is best tested or which aspects is most important procedural knowledge such as fact. Individual differences in academic performance have been linked to differences in intelligence and personality. Students with high IQ (Intelligence Quotient) tests and those who are higher in consciousness (linked effort and achievement motivation) tend to achieve highly in academic settings.

Currently, a wide range of testing procedures is used in the U.S and elsewhere in order to determine academic achievements. Each type of procedure is designed to carry out specific functions such as Achievement test; Aptitude test; Intelligent test; Interest inventories; Objective personality test. Mathematics teaching therefore, is supposed to be result oriented and students centered, and this can only be achieved when students are willing and the teachers are favorably disposed, using the appropriate methods and resources in teaching the students. Students by nature are curios; they need to be actively involved in the learning process in which they are continuously equipping, testing, speculating and building their own personal construct and knowledge. It is only by personalizing such knowledge that it becomes valid, meaningful and useful to them. In mathematics learning, students need to actively construct their own personal awareness and meaning. But it is disheartening that researches and data from National Examination bodies have shown a consistently poor performance of students in mathematics. Majority of secondary school students often dread and show negative readiness, fear, and developed anxiety towards Mathematics and subsequently influence their achievement in the examination. Therefore, poor performance of students in mathematics has been a source of worry to the stakeholders [21], [18]. Moreover, [17] also supported that poor study habit, poor vocational goals and objective, socio-economic status, anxiety, emotion and other relevant condition of learning can cause poor academic performance. Despite the prime position mathematics occupies in the National Policy on Education and the efforts made by researchers to enhance students' performance in mathematics, there are still poor report of student achievement in the subject. Some of the reasons identified for this failure are students' attitude, time constraint for practice's, phobia of the subject, non-coverage of syllabus by the teachers, class size, non-professionalism and environment [15].

Nevertheless, despite the effort of scholars and researchers in finding lasting solution to the problems of low and poor mathematics learning achievement among senior secondary school students in the school system. Little studies have concentrated on the student attitudes on mathematics learning achievement among senior secondary school students. In order to fill the gaps in the previous study and add more to the existing literatures, the present study intends to investigate the relationship between student attitudes and mathematics learning achievement among senior secondary school students in Yobe State, Nigeria.

The standard of education in Nigeria has fallen to a considerably sad state; the performance of candidates in public examinations and more especially in mathematics in Nigeria has been consistently questionable. Poor performance of secondary school students in public examinations has indicated that many things have gone wrong in the educational sector. Recently, there is considerably report of poor learning achievements of students in General Mathematics which is one of the prerequisite for all science and technology courses. Uwadie's, Has reported that less than 42% of registered candidate in SSCE obtained credit pass in Mathematics [9]. Even the SSCE results released by WAEC for 2016-2018 indicated students' poor achievement in the subject. On similar note Yobe state has consistently trailed behind other state in external examination. For example only 13.9% passed English and mathematics in 2016, 26.70% in 2017 and in 2018 it decreased to 15.82% (National Bureau of Statistics, 2019). This perhaps explained the trend of high failure rate in Mathematics. The mass failure in mathematics may be as a result of students' attitude, inadequate knowledge, skills and other basic mathematics concepts.

Research on the correlation between attitudes and learning achievement has been carried out by several researchers. In Malaysia, there is a study that revealed the relationship between attitudes and student achievement [22]. In Indonesia, there are several studies that also reveal similar results, including research on the correlation between attitudes and mathematics learning outcomes [23], the correlation between attitudes and science learning outcomes [24], analysis of student attitudes on the approach to the factor structure of mathematics achievement [25], and meta-analysis to determine the correlation between student attitudes and student mathematics learning outcomes in Indonesia [26]. However, the researchers found that there was no research on the correlation between student attitudes and mathematics learning achievement in high school students in Yobe state, Nigeria. The purpose of this study is to investigate the correlation between student attitudes and mathematics learning achievement in high school students in Yobe state, Nigeria.

2. METHOD

The study employed mainly correlational research design. Correlational research involves collection of data of a specified population and ascertaining the relationship among variables of interest. The objectives of the study are to examine the relationship between students' attitudes and mathematics learning achievements and to examine the differences between male and female students' attitude on mathematics learning achievements of Senior Secondary School Students in Yobe state. In this study, the relationship between student attitudes and mathematics learning achievement was investigated. The population for the study comprised 7,115 senior secondary school students in Yobe State, Nigeria. A sample of 367 students' using krejcie and Morgan table were selected; schools were represented proportionately as per the percentage by which they appear in the larger population. Systematic sample was used to select individual sample subject at each school visited.

The Research instruments used for the study were questionnaire designed by the researchers to illicit responses from the students and end of term 3ʳᵈ term mathematics examination scores of the students' which was transformed using t and z test. The questionnaire was named "Students' Attitude on Mathematics Learning Achievement" (SAMLA). The questionnaire has two (2) sections. Section A contains bio-data information while section B contains the items that respondents are expected to express their attitude on learning mathematics. Four (4) point Likert-like type options of Strongly

Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) were used. The total numbers of items in the questionnaire are 1 to 30. The instrument was pilot tested, and the reliability coefficient obtained was found to be .83, by virtue of the value obtained, the instrument was adjudged to be reliable for the study.

The following hypotheses were formulated and tested at 0.05 level of significance

H_{o1} : There is no significant relationship between students' attitudes and Mathematics learning achievement

H_{O2} : There is no significant difference between male and female Students' attitudes on mathematics learning achievement.

The researchers distributed the questionnaire to the selected students. Face to face method of distribution was adopted by the researchers. Similarly, the researchers also anticipates that not all questionnaire distributed would be returned and hence distribute as many question as possible to deal with the problem of mortality which could be treat to internal validity of the study. The data gathered from the administration of the research instruments was analyzed using inferential statistical tools, specifically PPMC and t-test of independent sample were used to test the null hypotheses at 0.05 level of significance.

3. RESULTS AND DISCUSSION
3.1 Pearson Product Moment Correlation

In order to test the null hypothesis that there is no significant relationship between student attitudes and mathematics learning achievement of senior secondary school students, Pearson Product Moment Correlation was performed.

Table 1. Pearson Product Moment Correlation Table on the Significant Relationship Between Students Attitudes and Mathematics Learning Achievement of Senior Secondary School Students

Variable	N	Mean	SD	Df	R	P	Remark
Students Attitude	367	30.08	7.13				
				365	-.710	.000	Reject H_{O1}
Mathematics Achievement	367	14.45	2.67				

From the above Table 1, a significant relationship was found between students attitude and mathematics learning acheivement. This was based on the correlation value (r=-.710; p=.000; p<.05). Based on the obtained result, a significant and direct relationship exist between student attitudes and mathematics learning acheivement.

Students' attitude has significant influence on Mathematics learning achievement of secondary school students. Similarly, the finding is in consistence with the previous finding of Cai's who indicated that students' participation is a statistically significant predictor of their mathematical achievement and also promoted positive behaviours and emotional development [3]. Busari's Opined that mathematics learning strategy is based on the idea that learning is a naturally social act in which the participants talk among themselves and it is through the talk that learning occurs [17]. In the same vain, Demir's demonstrated that students whose parents were highly educated and exposed to mathematics before in their lives tend to show more success in mathematics than their peers whose parents were less educated and not being exposed to mathematics [8]. Therefore, rich learning environments that incorporate meaningful mathematical attitude and experiences are associated with higher achievement and genuine home/school collaboration has also been found to lift children's achievement significantly [10], [11].

3.2 Independent Sample t-test

H$_{O2}$ the Table 2 deduced the fact that t. calculated is -8.09, P-value 0.00 and level of significance, 0.05. P-value is therefore less than the level of significance. The null hypothesis is hereby rejected, meaning that there is significant gender difference in the measurement of attitude of students' on mathematics learning achievement.

Table 2. Independent Sample t-test on Significant Gender Difference in the Attitude of Students on Mathematics Learning Acheivement

Groups	N	Mean	t-cal	Df	P-value	Sig
Male	258	44.47				
			-8.09	355	0.00	0.05
Female	118	61.11				

The female students' have high Mathematics phobia than their male counterpart who shows with low Mathematics learning phobia. This is consistent with the study of [5] who found that Mathematics power is increased when anxiety is diminished. As noted in literature, Mathematics anxiety affects student achievement and attitude towards Mathematics and it may also lead to poor performance and avoidance of Mathematics [6]. They further note that students' attitude in its many and varied ways is a vital parameter for increasing their mathematics achievement. Many people think of Mathematics as a punishment or something that induces stress, thus Mathematics anxiety has been proposed as an explanation for poor Mathematics achievement. In separate meta-analysis study, research has shown that successful students have strong academic support from their self-efficacy and parental motivation [7]. These therefore explained that mathematics anxiety was related to Mathematics performance among individuals at various genders. It can also be associated with Mathematics performance before and during secondary school. Mathematics anxiety is common among secondary school students but more so among female students [19].

4. CONCLUSION

This study investigated the correlation between students' attitudes and mathematics learning achievements and also examines the differences in student attitudes towards mathematics learning achievements between male and female high school students. Based on the results of the study, it is known that students' attitudes and learning achievement in mathematics are positively related, and female students are more prone to math phobia. Based on these findings, the researcher recommends that teachers should be aware of changes in student attitudes in learning mathematics, whether changes due to factors from home, school, or the wider community and ensure that math phobia can be drastically minimized. And teachers should be more careful in teaching female students because they are more prone to math phobia by increasing the provision of guidance and counseling in schools.

REFERENCES
[1] Federal Republic of Nigeria, "*National Policy on Education.* Lagos, Nigeria": NERDC, 2013.
[2] G. Anthony and M. Walshaw, Characteristics of Effective Teaching of Mathematics: A View from the West. *Journal of Mathematics Education,* vol. 2 no. 2, pp 147-164, 2009.

[3] R. Guy, R. Tali, and B. Mordechai, "Mothers' parenting practices and adolescents' learning from their mistakes in class: The mediating role of adolescent's self-disclosure". *Learning and Instruction,* vol. 19*,* pp 506-512, 2008.

[4] J. Cai, "Investigating parental roles in students' learning of mathematics from a cross national perspective". *Mathematics Education Research Journal,* vol. 15 no. 2, pp 87-106, 2003.

[5] D. A. Oluwole, and K. O. Muraina, "Effectiveness of Motivational Enhancement Therapy in Enhancing Mathematics Learning Gains among School-Going Adolescents in Oyo State, Nigeria". *The Pacific Journal of Science and Technology,* vol. 17 no. 1, pp 140-151, 2016.

[6] J. Friedel, K. S. Cortina, J.C. Turner and C. Midgley, "Changes in efficacy beliefs in mathematics across the transition to middle school: Examining the effects of perceived   teacher and parent goal emphases". *Journal of Educational Psychology,* vol.102, pp 102-114, 2010.

[7] S. B. Sheldon, "*In School, family, and community partnerships: Your handbook for action   (3rd Ed.)*". USA: Corwin Press, 2009.

[8] I. Demir, S. Koloc, and H. Unal, "Effects of students' and schools' characteristics on   mathematics achievement: Findings from PISA 2006," *Procedia Social and Behavioral Sciences,* Vol. 2*,* pp 3099–3103, 2010.

[9] H. J. Uwadie, "Relationship between boy's and girl's nonverbal ability and mathematical achievement". *School Psychology International* vol. 17*,* pp 71-80, 2014.

[10] G. Abreu and T. Cline, "Parents' representations of their children's mathematics learning in multiethnic primary schools. *British Educational Research Journal,* vol. 31 no. 6, pp 697-722, 2005.

[11] F. Biddulph, J. Biddulph and C. Biddulph. *The Complexity of Community and Family Influences on Children's Achievement in New Zealand: Best Evidence Synthesis Iteration (BES).* New Zealand: Ministry of Education, 2003.

[12] J. M. Olson and M. P. Zanna, "Attitude and Attitude charge". *Annual Review of Psychology,* vol. 44, pp 117-132, 2003.

[13] B. M. Penda, "Effects of Meta-Cognition and 5Es Constructivist Instructional Strategies on Biology Students Achievement and Attitude on Senior Secondary Schools in Kogi State". *African Journal of Education Assessors (AJEA)* vol. 7 no. 1, pp 32-43, 2020.

[14] B. O Ellah, and E. E. Achor, "Cognitive styles and attitude to science of senior Harman, J. H." *ICSHER JOURNAL* Vol.1, No.3 pp.10 – 26, 2015

[15] O. C. Adaku, "Effect of Assertiveness Training and Cognitive Behaviour Technique   (CBT) on the Attitude Charge of the Physically Challenge Students in Abia State" *The Nigerian Educational Psychologist* Vol. 17, pp 109-121, 2019.

[16] G. W. Allport, *"Attitudes" In C. Murchison (Ed). A handbook of Social Psychology*, Worcester: Mass Clark University Press, 1935.

[17] A. O. Busari. "Assessing the Relationship of Self-regulation, Motivation and Anxiety on   Mathematics Achievement of Elementary School Children in South -Western Nigeria". *An   International Multidisciplinary Journal.* Vol. 7 no. 3, pp 110-126, 2013

[18] A. Adejumo, D. A. Oluwole, and K. O. Muraina, "The influence of some psychological   factors on the learning gains of University undergraduates in

Mathematics in Oyo State, Nigeria." *Educational Research AssociationThe International Journal of Educational Researchers vol.* 9 no. 2, pp. 16-2, 2018.

[19] M. D. Wang, and F. Ye, *Examining the intellectual and Motivational factors leading to gender disparity career. Front Psychology. 6:36.* University of Pittsburgh, USA, 2015.

[20] A. Ganai, and E. Ashraf, "Psychological Adjustment" 2013 Available: http://www.cpm.ca/Educational%20Trainin%20Program%20Criteria.Htm [Assessed: 20-03-2019]

[21] K. O. Ajayi, and K. O. Muraina, "Parents' education, occupation and real mother's age as predictors of students' achievement in Mathematics in some selected secondary schools in Ogun State, Nigeria". *Academic Leadership online Journal,* Vol. 9 no. 2, pp 23-43, 2011.

[22] Bakar, at all, "Relationships between university students' achievement motivation, attitude and academic performance in Malaysia". *Procedia Social and Behavioral Sciences*, vol 2, pp 4906–4910, 2010

[23] Ajisuksmo, C. R. P., Saputri, G. R. The Influence of Attitudes towards Mathematics, and Metacognitive Awareness on Mathematics Achievements. Creative Education,vol 8,no 2, pp 486-497, 2017

[24] Ilhamdi, Idrus. A, Santoso. D, "Sikap Belajar Kaitannya Dengan Hasil Belajar Ipa Siswa Madrasah Tsanawiyah Al Maarif Praya Timur Kabupaten Lombok Tengah" *J. Pijar MIPA*, vol 16, no 1, pp 129-135, 2021

[25] Bayaga. A, Wedasango.N," Analysis of Students' Attitudes on Mathematics Achievement-Factor Structure Approach" International Journal of Educational Sciences, vol 6,no 1, pp 45-50, 2014

[26] Harun, D. Badrun, M. Abdul "Student Attitude and Mathematics Learning Success: A Meta-Analysis" *International Journal of Instruction,* vol 14, no 4, pp 209-222, 2021