



Nexus among Senior Secondary Students' Interest, Anxiety and Achievement in Mathematics in Gwagwalada, Nigeria

¹Jekayinfa, Olatunji James, ²Salman, Medinat Folorunsho

¹National Mathematical Centre, Abuja.

²Department of Science Education,
Faculty of Education,
University of Ilorin, Ilorin, Nigeria.

ABSTRACT

The study explored the relationships that existed among SS1 Students' interest, anxiety and achievement in Mathematics in Gwagwalada, Nigeria. Four research questions were raised and answered. Four corresponding hypotheses were also formulated and tested at 0.05 alpha level of significance. Correlational research design was adopted for the study. Students from two schools were selected for the study consisting 31 male and 43 female students. Scores from Mensuration test, interest and anxiety questionnaires were the data used for the study. The data were analyzed using PPMC and regression analysis and the results showed that negative but significant relationships existed between students' interest and anxiety; and students' anxiety and achievement in Mensuration. Also positive and significant relationship existed between students' interest and achievement in Mensuration. It was therefore recommended that stakeholders in Mathematics Education should endeavor to devise teaching strategies that will improve students' interest in Mathematics with a view to reducing their anxiety and ultimately improving their achievement in the subject.

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INTRODUCTION

The teaching and learning of Mathematics in schools across all levels of education is a herculean task that must be taken seriously. This is because of the very important position that the subject occupies as the basic tool for economic growth and national development. Also, the central position that mathematics occupies in the study of science and technology gives more credence to its importance, thereby making it expedient for education stakeholders to make its teaching and learning in schools a success.

Apart from the national and scientific role that mathematics plays, it is similarly a crucial and critical tool required by individuals to function effectively. Everybody needs it at any point in time (Anice, 2005). Furthermore, Herbor-Peters (2001) described mathematics as very important because of its many utilities in the home, bank, market, industry and so on.

As important as mathematics has been widely reported to be, students at all levels of education are still struggling with its study. Students especially at the secondary school level are not performing satisfactorily well particularly in external examinations. Results released by West Africa Examination council (WAEC) for 2015, 2016 and 2017

still showed that quite some percentage of students fail mathematics. This should be a concern to all well-meaning stakeholders. Factors that have been discovered to be responsible for this ugly situation include students' lack of Interest in studying Mathematics, Teachers' use of inappropriate teaching methodology and students' anxiety towards mathematics (Obioma, 2011; Ojimba 2012).

Students' interest in mathematics is a very important factor to consider if effective teaching and learning would be achieved. It is a key determinant as to whether students will learn the subject meaningfully or not. Interest is a feeling of like or dislike towards an activity. Interest is also concerned with choice or preference for a particular type of activity or the other. It is a sense of concern with and curiosity about someone or something, the feeling that somebody has when he or she wants to know or learn something. Interest is the zeal or willingness in an activity for which one derives some pleasure (Harbour-Peters, 2002).

Hornby (2006) defined interest as a feeling somebody has when he or she wants to know or learn about something. Also, Harbour-Peters (2002) defined interest as a tendency to become absorbed in an experience and continue in it. Interest therefore is the zeal or willingness to engage in an activity from



which one derives some pleasure. It can also be defined as a state of curiosity or concern about, or attention given to something. So, to be interested in something means that thing arouses the curiosity of the fellow. Also, to be interested in a thing may mean to cause to become involved or concerned with such thing. Interest is a power within a person.

Again, interest has to do with enthusiasm. It is a feeling that brings about giving special attention or consideration to an object, class of object, event or a course. It is a quality that makes something more appealing, interesting and loveable. Someone's interest is what such person enjoys doing, learning and researching about. Interest is very key to the individual's learning as it is the feeling of wanting to give his or her utmost attention to something, or of wanting to be involved with, learn and discover more about something. If one is interested in something, one wants to hear more, know more and be more involved in such thing.

Ainley and Bemdorff (2002) noted that interest and learning are focused on three types: individual, situational and topic. Individual interest is described as a relatively enduring predisposition to attend to a certain objects and events and to engage certain activities (Harbour-Peters, 2002). This behaviour is associated with psychological state of positive effect and persistence and tends to result in increasing learning. For example, a learner who has a particular individual interest in geometry seeks opportunities to engage geometry related materials and associated activities, and while so engaged, experiences enjoyment and therefore expands knowledge in geometry. In this, the researcher noted that within the broader domain of schooling, students don't have just one stereotype interest but a network or system of individual interests, some closely related to goals of classroom learning.

Individual interest, according to Ainley and Bemdorff (2002), can be defined in terms of specific domains such as school subject (e.g. accounting, Literature in English, Mathematics and Physics) or specific activities like dye and art, cultural engagements, sports and music. Also, students having individual interest may likely have a more general individual interest in learning. General individual learning according to Ainley (1998) is expressed as the desire to acquire new information, to find out about new objects, events, and ideas not restricted to any narrow domain. This may involve approaching and acquiring information about something. It may also involve seeking more

information about something the student already knows. As Ainley (1998) pointed out, general learning interest depicts a characteristic way of approaching novel, uncertain or a puzzling phenomenon with the goal or purpose of understanding the phenomena.

Mathematics anxiety is a factor that could be a hindrance to students studying Mathematics (Abbasi, Samadzadeh, & Shahbazzadegan, 2013). Anxiety is a state of fear and apprehension towards an event. Many students experience anxiety towards Mathematics. The anxiety students experience towards Mathematics and Mathematics tests and examinations is in three levels namely low, moderate and high (Nonyelu & Anikweze, 2013). Students with low and medium anxiety towards Mathematics can still manage to get along with the learning of the subject without much disruption, but students with high anxiety towards Mathematics tend to be out rightly troubled with anything relating to Mathematics. Nonyelu and Anikweze (2013) also reported that the relationship between anxiety and achievement is significant. That is, students with high anxiety in Mathematics perform low in the subject and vice-versa.

The source of Mathematics anxiety in students may be due to poor instructional methods and the quality of Mathematics teaching at the elementary school level. Also, Mathematics anxiety may happen in the classroom due to teachers' lack of consideration of different learning styles of students. Paeinkerton (2005) confirmed that Mathematics anxiety may develop in children before school from the wrong perception inherited from parents who have anxiety towards Mathematics themselves. The wrong teaching methods employed by teachers in school may then heighten such anxiety.

Mathematics anxiety in students varies from male to female students. A study conducted by Abadi (2004) showed that there was a significant difference between girls' and boys' Mathematics anxiety, as Mathematics anxiety in boys is higher than that of girls. Therefore, Mathematics anxiety in students is a challenge that must be tackled to ensure effective teaching and learning of Mathematics in Nigerian schools. Nonyelu & Anikweze (2013) suggested that if teachers must reduce students' anxiety level about Mathematics tests, they should employ frequent testing, assignments, projects, learning by doing, students' active participation in Mathematics lessons, students-centered learning, adequate teaching/learning methods and aids and test-taking strategies.



Efforts of all education stakeholders are expected to be geared towards improving students' achievement in Mathematics especially in external examinations. Students' achievement in external examinations is the authentic judge of how effective and efficient an educational system is. An education system is deemed effective if a better percentage of the students' population excel in their studies, which is measurable by the percentage credit pass they have in the subjects they offer. For example, students in Nigeria are under compulsion to pass five subjects in external examinations which should include English Language and Mathematics in order to be able to progress for higher studies. So, all endeavors at getting students to learn Mathematics meaningfully to get good grades in the subject would be in the right direction.

Purpose of the Study

The main purpose of this study is to investigate the relationship among Secondary School Students' Interest, Anxiety and Achievement in Mathematics in Gwagwalada, Abuja, Nigeria. Specifically, the study intends to find out:

1. the relationship between students' interest and anxiety in Mathematics;
2. the relationship between students' interest and achievement in Mathematics;
3. the relationship that exists between students' anxiety and achievement in Mathematics and
4. the relationship among students' interest, anxiety and achievement in Mathematics.

Research Questions

Four research questions were raised in this study to include:

1. What relationship exists between students' interest and anxiety in mathematics?
2. What is the relationship between students' interest and achievement in Mathematics?
3. What relationship exists between students' anxiety and achievement in Mathematics?
4. What is the relationships among students' interest, anxiety and achievement in Mathematics?

Hypotheses

Corresponding hypotheses formulated are:

- Ho₁**: There is no significant relationship between students' interest and anxiety in Mathematics;
Ho₂: There is no significant relationship between students' interest and achievement in Mathematics;
Ho₃: There is no significant relationship between students' anxiety and achievement in Mathematics;

Ho₄: There are no significant relationship among students' interest, anxiety and achievement in Mathematics.

METHODOLOGY

The study adopted a Correlational Research Method to establish the relationships that existed among students' interest, anxiety and achievement in Mensuration. Two equivalent secondary schools in Gwagwalada Area Council in Abuja were selected for the study. Senior Secondary School One (SS 1) students were purposively selected for the study because Mensuration, which is the topic in Mathematics taught for the purpose of the study is in SS 1 Mathematics Curriculum.

Mensuration topics which included Measurements of Plane Shapes, Area and Perimeter of a Sector, Circle Segments, Length of an Arc etc were taught the students for two weeks. 20 questions were drawn from the topics taught and administered to the students. Students scripts were marked and scored. Interest and anxiety questionnaire adapted by the researcher were also administered to the students. The questionnaires so administered were validated by experts. The reliability of the questionnaires was also ensured by test retest method. The reliability coefficients gotten from the interest and anxiety questionnaires were 0.83 and 0.86 respectively. Students scores from the Mensuration test, interest and anxiety questionnaires were used as the data for the study.

Research questions 1, 2, 3 and hypotheses 1, 2, 3 were answered and tested respectively using Pearson's Product Moment Correlation (PPMC) while research question 4 and hypothesis 4 was answered and tested respectively using Regression Analysis.

RESULTS

Research Question 1: What relationship exists between students' interest and anxiety in mathematics?

Hypothesis 1: There is no significant relationship between students' interest and anxiety in Mathematics

Table 1 shows that Pearson correlation analysis value yielded -0.528 which is negatively correlated and significant with P value $0.000 < 0.05$. This shows a significant result. Hence, the null hypothesis is rejected. This means that there is a significant but negative relationship between students' interest and anxiety when taught Mensuration using CVI ($r = -0.528$; $P < 0.05$). This suggests that as students'



interest in Mensuration increases, their anxiety towards the topic decreases.

Table 1: Correlation of Students' Interest and Anxiety taught Mensuration

| Variables | N | Mean | SD | r | df | Sig (2 tailed) | Decision |
|-----------|----|------|------|-------|----|----------------|----------|
| Interest | 74 | 87.5 | 5.58 | -.528 | 72 | .000 | Rejected |
| Anxiety | 74 | 41.6 | 7.99 | | | | |

P<0.05

Research Question 2: What is the relationship between students' interest and achievement in Mathematics?

Hypothesis 2: There is no significant relationship between students' interest and achievement in Mathematics

Results from table 2 shows the Pearson correlation analysis value which yielded 0.274 which is significant with P value $0.018 < 0.05$. This shows a significant result. Hence, the null hypothesis is rejected. This means that there is a significant relationship between students' interest and achievement when taught mensuration using CVI ($r = 0.274$; $P < 0.05$).

Table 2 : Pearson's Correlation of Students' Interest and Achievement Taught Mensuration

| Variables | N | Mean | SD | r | df | Sig (2 tailed) | Decision |
|-------------|----|------|------|------|----|----------------|----------|
| Interest | 74 | 87.5 | 5.58 | .274 | 72 | .018 | Rejected |
| Achievement | 74 | 56.1 | 18.1 | | | | |

P<0.05

Research Question 3: What relationship exists between students' anxiety and achievement in Mathematics?

Hypothesis 3: There is no significant relationship between students' anxiety and achievement in Mathematics

Table 3 shows the Pearson correlation analysis value yielded -0.187 which is significant with P value $0.011 < 0.05$. This shows a significant result. Hence, the null hypothesis is rejected. This means that there is a significant but negative relationship between students' anxiety and achievement when taught mensuration using CVI ($r = -0.187$; $P < 0.05$).

Table 3: Pearson's Correlation of Students' Anxiety and Achievement Taught Mensuration Using CVI

| Variables | N | Mean | SD | r | df | Sig (2 tailed) | Decision |
|-------------|----|------|------|-------|----|----------------|----------|
| Anxiety | 74 | 41.6 | 7.99 | -.187 | 72 | .011 | Rejected |
| Achievement | 74 | 56.1 | 18.1 | | | | |

P<0.05

Research Question 4: What is the relationships among students' interest, anxiety and achievement in Mathematics?

Hypothesis 4: There are no significant relationship among students' interest, anxiety and achievement in Mathematics

In order to determine the relationship among the interest, anxiety and achievement of students' interest and anxiety were considered as independent variables and achievement as the dependent variable for the purpose of analysis. So, the contribution of each independent variable (interest and anxiety) to

achievement was examined using linear regression analysis. Table 4 shows that the coefficient of multiple regression (R) value yielded 0.401 which is significant with P value $0.002 < 0.05$. This shows a significant result. Hence, the null hypothesis is rejected. This means that relationships exist among interest, anxiety and achievement of students taught Mensuration using CVI. $R = 0.401$ means there was 40.1% relationship between the independent variables (interest and anxiety). Also from the table, $R^2 = 0.161$ which means 16.1% variation in the dependent variable (achievement) that can be

explained or predicted by the independent variables (interest and anxiety).

It can be seen that interest with a value of 0.357 has a positive relationship with achievement and it is significant F (0.002 < 0.05). Also, anxiety's value of -0.228 has a negative relationship with achievement

and it is also statistically significant F (0.041 < 0.05). Hence, hypothesis 4 was rejected which means that significant relationships existed among interest, anxiety and achievement of students. This means that students with high interest in Mensuration had low anxiety and high achievement in the topic.

Table 4: Regression Analysis of Students' Interest, Anxiety and Achievement Taught Using CVI

| Variable | No | B | Sig | R | R ² | Sig (2 tailed) | Decision |
|-------------|----|-------|------|------|----------------|----------------|----------|
| Interest | 74 | .357 | .002 | | | | |
| Anxiety | 74 | -.228 | .041 | .401 | .161 | 0.002 | Rejected |
| Achievement | 74 | | | | | | |

P<0.05

SUMMARY OF FINDINGS

1. There was a significant but negative relationship between students' interest and anxiety in Mensuration.
2. Significant relationship existed between students' interest and achievement in Mensuration.
3. There was a significant but negative relationship between students' anxiety and achievement in Mensuration..
4. Significant relationships existed among interest, anxiety and Achievement of students in Mensuration.

DISCUSSION OF FINDINGS

The study revealed a negative relationship between students' interest and anxiety in Mathematics. This means that students with high interest mean scores had low anxiety mean scores which explains the fact that students who are interested in studying Mensuration are less anxious to study the topic. The works of Ackerman et al (2001) and Wells Sanchez & Attridge (2009) also reported negative relationship between students' interest and anxiety which corroborated the findings.

More findings revealed a positive relationship between students' interest and achievement when taught mensuration using CVI. The implication of this is that students with high interest mean scores also had high achievement mean scores, which mean that the more students are interested in Mensuration, the more they perform better in the topic. According to this finding, students' interest in Mensuration is a direct function of their achievement. This is consistent with the findings of Thomas (2005) and Joosha'ei (2008) who also reported positive relationship between students' interest and achievement in Mathematics.

The study also revealed a negative relationship between students' anxiety and achievement. Students with high anxiety mean scores had low

achievement mean scores. The implication of this is that anxiety is a major factor for students' unsatisfactory performance in Mathematics. Another implication of this is that students with low anxiety mean scores had high achievement mean scores. This means that any effort at reducing students' anxiety in mathematics is one in the right direction and such should be encouraged because students' achievement in Mathematics would be good for it. The works of Puteh (2002), Zachariah and Noh (2008), Fulya (2008) and Nonyelu and Anikweze (2013) which reported negative relationships between students' anxiety and achievement corroborated this finding.

Lastly, the findings revealed a significant relationship among students' interest, anxiety and achievement when taught Mensuration. This is a further attestation to the fact that positive relationship exist between interest and achievement while negative relationships exist between interest and anxiety, and anxiety and achievement. In another way, we can through this finding infer that the higher the interest of a student in any Mathematics content, the lower his/her anxiety, and the higher his/her achievement in the content.

It can further be correctly inferred that the lower the students' interest in the Mathematics content, the higher his/her anxiety, and the lower his/her achievement in the Mathematics Content. Therefore, any effort put in place to increase students' interest and reduce their anxiety in Mathematics would culminate in enhanced achievement of students in the subject.

CONCLUSION AND RECOMMENDATION

This study confirmed relationships among students' interest, anxiety and achievement in Mathematics. This means that given any effective instructional strategy, once students' interest is positively enhanced in any Mathematics topic, there is the tendency that students anxiety towards the



topic would be reduced which would ultimately improve their achievement in the topic.

Government, school owners, teachers and other stakeholders are therefore expected to devise teaching strategies and methods aimed at increasing students' interest in Mathematics which in turn should reduce their anxiety and ultimately improve their achievement in the subject.

REFERENCES

- Abadi, L. (2004). *Relationship between demographic variables and mathematics anxiety in high school students in Tehran*. Masters Thesis, Tehran Teachers Training University, Department of Psychology and Educational Sciences.
- Abbasi, M., Samadzadeh, M., & Shahbazzadegan, B. (2013). Study of mathematics anxiety in high school students and its relationship with self-esteem and teachers' personality characteristics. *Procedia-Social and Behavioral Sciences*, 83, pp. 672-677. Elsevier Ltd. Retrieved from www.sciencedirect.com
- Ackerman, P. L., Bowen, K. R., Beier, M. E., & Kanfer, R. (2001). Determinant of Individual Differences and Gender Differences in Knowledge. *Journal of Educational Psychology*, 93(4), 797-825.
- Ainley, M. D. (1998). Interest in learning in the disposition of curiosity in secondary school students: Investigating process and context. In L. Hoffiman, K. A. Krapp, & J. Renniger (Ed.), *Proceedings of the Second Conference on Interest and Gender, Kiel, Germany*. Germany: Institute fur die padagogik der naturwissenschaften.
- Ainley, M., & Bemdorff, S. (2002). Dynamic measures for studying interest and learning. In P. R. Pintrich, & M. L. Maerh, *Advances in motivation and achievement: New directions in measures and methods*. Amsterdam: JAI Press.
- Anice, J. (2005). *Teaching of Mathematics*. India: Neelkmal Publications, Hyderabad.
- Fulya, Y. S. (2008). Mathematics Anxiety among 4th and 5th Grade Turkish Elementary School Students. *International Electronic Journal of Mathematics Education*, 3(3), 55-63.
- Harbour-Peters, V. A. (2002). *Attitude and interest of the students to the mathematical science in Nigeria. A commissioned paper of the mathematical sciences education summit*. Abuja: National Mathematical Centre.
- Harbour-Peters, V. F. (2001). *Mathematics as a tool for Use: Implication to the Society. Proceedings of the 41st Annual Conference of Mathematical Association of Nigeria (MAN)*, (pp. 65-69).
- Jososha'ei, E. (2008). *Examining the factors affecting the learning of mathematics in high school students*. Faculty of Graduate Studies, Islamic Azad University, Zahedan.
- Nonyelu, R. N., & Anikweze, C. M. (2013). Assessment of the Anxiety Levels of Mathematics Students in Federal Capital Territory (FCT) Junior Secondary Schools. *ABACUS-The Journal of the Mathematical Association of Nigeria*, 37(1), 73-83.
- Obioma, U. A. (2011). Re-branding the strategies for teaching mathematics: the case of scaffolding in Sadiku, Fajemidagba and Adeniyi (Eds). *Proceedings of Annual Conference of Mathematical Association of Nigeria (MAN)*.
- Ojimba, D. P. (2012). Mathematics education for sustainable development: Implication for scientific and technology literacy. *Journal of Education and Social Research*, 3(15), 22-30.
- Paeinkerton, S. P. (2005). *Attention Deficits and Hyperactivity in Chilfren*. ASGE Publications.
- Puteh, M. (2002). *Factors associated with mathematics anxiety*. Tanjong Malim: Penerbitan Universiti Pendidikan Sultan Idris.
- Thomas, R. L. (2005). *A comparison between traditional and constructivist teaching in college mathematics*. Retrieved May 28, 2014, from Journal of Innovative Higher Education: <http://www.springerlink.com/>
- Wells, B. H., Sanchez, H. A., & Attridge, J. M. (2009). *Modelling Students' Interest in Science, Technology, Engineering and Mathematics*. Retrieved from http://www.raytheon.com/responsibility/rtnwcm/group/public/documents/content/rt_n_stem_whaper.pdf.
- Zachariah, K. M., Komen, K., George, M. M., & George, R. N. (2012). Factors contributing to students' poor performance in Mathematics at Kenya