Development and Validation of Mathematics Interest Scale for Senior Secondary Schools in Uyo L.G.A, Akwa Ibom State, Nigeria

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Abstract

This study developed and validated Mathematics Interest Scale with the view of ensuring that the items in the bank are calibrated and are of high quality. Specifically, the study determined the acceptable reliability index of Mathematics interest scale, examined the nature of relationship between mathematics interest, attitude, motivation and achievement in mathematics, examined the relationship between students' personal characteristics and mathematics interest, identified the factor compositions of the mathematics interest scale and examined the item parameters of the Mathematics Interest Scale. A multi-stage sampling technique was deployed in the selection of 600 respondents for this study. Questionnaire consisting of subsections to reflect the research questions and specific purposes of the study was used to collect the data. Collected data were analyzed using frequencies, percentages means, Cronbach alpha, Canonical Correlation, multiple regression, factor analysis. Results revealed that the reliability index of the Mathematics interest scale found to be 0.963 is highly acceptable. There is a statistically significant relationship among mathematics interest, motivation towards mathematics, attitude towards mathematics and mathematics achievement Score. Sex, family size and age taken together had some level of influence on the variance in the mathematics interest of the respondents. However, the joint influence of these independent variables on mathematics interest was not statistically significant. Conclusively, Mathematic Interest Scale for secondary schools students constructed, validated and put to use is reliable in determining the interest of students in mathematics. This study has shown that students especially in secondary schools in Akwa Ibom State can be relied upon to give some credible judgment with regards to their interest especially those that are known to them. It is recommended that this Mathematics Interest scale (MIS) be considered for adoption in the evaluation of learning and teaching effectiveness of mathematics in Akwa Ibom State.

Keywords: Development, validation, mathematics interest scale, attitudes

Introduction

Mathematics as a subject plays a key role in shaping how individuals deal with the various spheres of private, social and civil life. The inter-relationship between Mathematics, development and advancement of humans shows the importance of Mathematics in life. The government of Nigeria in recognition of the importance of Mathematics has demonstrated commitment to the teaching and learning of Mathematics. She promoted and popularized the study of Mathematics at all levels of education (FRN, 2004), and also brought about various developmental programmes at National Mathematics Centre (NMC). NMC has over the years carried out some Mathematics Improvement Projects (MIP) in an attempt to improve Mathematics teaching and learning in both the primary and secondary school levels. These projects according to (Thomas & Thomas, 2016) include organizing training workshops for teachers; distribution of instructional materials to schools; production of Mathematical games

to generate students' interest in learning mathematics; the national incentive scheme such as partial scholarship awards, certificates of merit and book prizes for pupils, students and teachers of Mathematics/institutions that have attained a measure of excellence in the teaching and learning of Mathematics at all levels.

In spite of the acclaimed importance of Mathematics and the substantial investment in its study by the Nigerian government, students' performance in the subject is still below expectation in Nigeria. This is evident in the analysis of result in mathematics for May/June Senior Secondary School Certificate Examination (SSCE) from 2010 - 2020 shown in Table 1.1 and figure 1.1 (Ogbonnaya, 2020 as cited by Udoukpong & Umoinyang, 2022). From the table and figure, out of 634,604 students who sat for the examination in 2010, only 208,244 representing 32.81% had between A1 to C6 in Mathematics. These are the only candidates who could use the result to advance to higher level provided they have credits in the other subjects relevant to their proposed course of study. On the other hand, 196,080 (30.90%) candidates had between D7 to E8. For admission into higher institutions for Mathematics related disciplines, it can be submitted that the total failure will be the addition of candidates with D7 – E8 and F9. Thus, 426, 360 (representing 67.19%) candidates failed. The achievement of students fluctuated from 2010 until 2016, when the percentage of candidates with (A1 – C6) increased from 42.32% to 47.85% in 2017, and then increased again to 58.24% in 2018. In subsequent years, the percentage of students with credit level pass in Mathematics dropped from 58.24% in 2018 to 49.00% in 2019, and further dropped to 41.50% in 2020. Although, in years 2018, the percentage pass at credit level rose above 50%, the ultimate has not been achieved. This is because not all the candidates who sat for the examination passed at credit level and above and would be admitted for further studies in tertiary institutions. This implies that 41.76% of those who sat for the examination in 2018 could not secure admission due to lack of credit level pass in Mathematics.

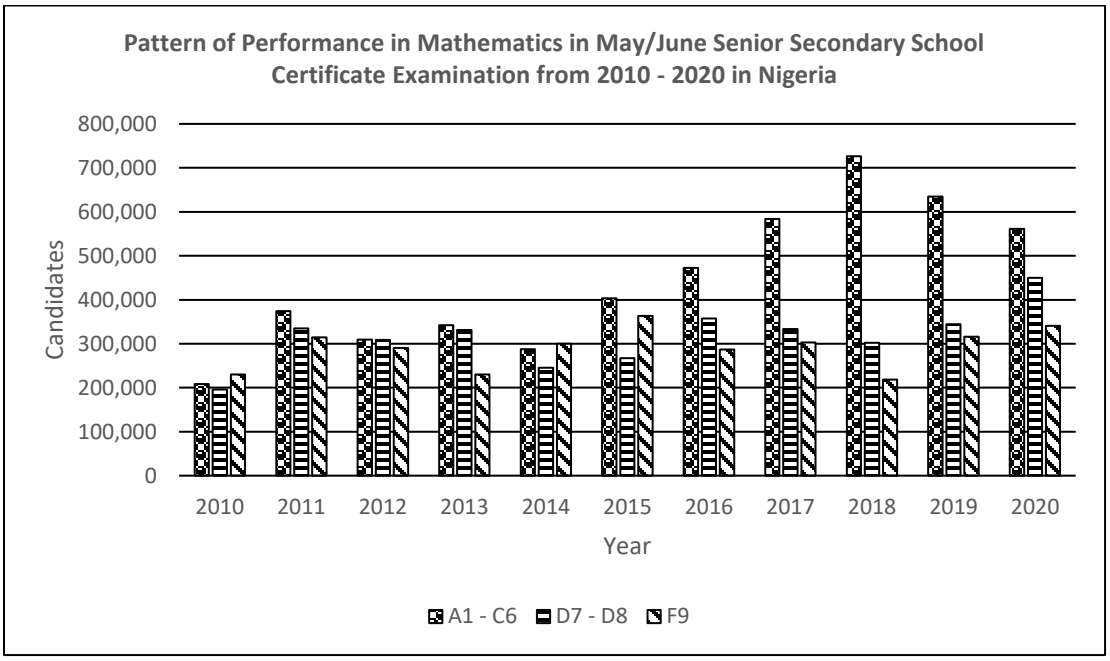

Figure 1.1: Pattern of Performance in Mathematics in May/June Senior Secondary School Certificate Examination from 2010 - 2020 in Nigeria

The analysis of SSCE results from 2010 - 2020 as shown on Table 1.1 and figure 1.1 indicates that the performance of students in Mathematics is still below expectation. Though, the performance improved in some years but the improvement is not sufficient to conclude that students have mastered Mathematics as expected. It is therefore obvious that, though Mathematics is very important in the Nigerian educational system, the performance in the subject is still low. This problem of low Mathematics achievement could adversely affect national development, especially in science and technology. This is one of the reason why Ifamuyiwa and Lawani (2018) indicates that the mass failure and consistent poor performance in Mathematics which students have shown for several years now casts serious doubt on the country's high attainment in science and technology. Therefore, this situation cannot be allowed to continue without check.

A number of factors have been attributed by researchers to the low and poor performance of students in mathematics at secondary school level (Abasi, 2024; Babayemi, Itighise, Umanah, Abasi & Umoh, 2023; Abasi, 2018a; Abasi, 2018b). These include, government related factors, curriculum related factors, examination body related, teacher, student, home and text-book related factors and instructional strategies. These problems have made Mathematics educators pay more attention to how to improve the teaching and learning of the subject in schools. Several new and modified methodologies have been proposed to improve performance in the subject, including the use of guided inquiry and expository approaches (Ado & Abasi, 2021; Abasi & Ado, 2021; Edoho & Abasi, 2019),

as well as computer and text-assisted programmed instruction approaches (Ado, Abasi & Nwankwo, 2017), among others. All these efforts were made to help break the cycle of poor performance of students in Mathematics. Unfortunately, much is still left to be achieved to reverse the poor trend of students' performance in the subject.

Among the factors highlighted above, the impact of students' interest on their performance is germane. Interest, which is a unique motivational variable, refers to a preferred engagement of a person with a specific object (i.e., a certain topic, activity, and idea), which can display itself as a psychological state as well as the relatively enduring predisposition toward these objects (Hidi & Renninger, 2016). According to the person-object theory of interest (Krapp, 2015), the development of interest relies on the ongoing interactions between the environment (object) and the person. Furthermore, interest can be divided into situational interest and individual interest (Hidi, 2020; Krapp *et al*., 2022; Krapp, 2015). Situational interest is a state of focused attention and affective reaction elicited by current environmental stimuli (Hidi & Baird, 2016; Hidi, 2020), whereas individual interest is a sustained preference for particular content (Krapp & Fink, 2022; Renninger, 2020). Individual interest develops from situational interest (Hidi & Renninger, 2016). Both types of interest have been shown to positively influence attention, cognitive performance, and affection (Hidi, 2020), although individual interest tends to have more enduring effects. Descriptors of interest in learning have included a host of names (e.g., academic, individual, personal, cognitive), which have been used interchangeably to some extent. Earlier research tended to focus on general interest across subjects. However, students often are more interested in some school subjects than in others. Contemporary research has stressed that interest is a domain-specific construct (Gogol et al., 2017), and that it is necessary to measure interest separately for different school subjects (e.g., Mathematic interest, English interest, etc).

More specifically, Neale (2019) defined Mathematics interest as aggregated measures of 'liking or disliking of Mathematics, a tendency to engage in or avoid Mathematical activities, a belief that one is good or bad at Mathematics, and a belief that Mathematics is useful or useless'. Obodo (2017) stated that interest is a very strong factor in the teaching and learning of Mathematics. The researcher further remarked that the degree and direction of attitude towards Mathematics are largely determined by the kind of interest developed by students for the subject. Nworgu (2021) stated that interest is a motivational construct from educational and psychological points of view which spur one into action in addition to giving direction to one's activities. The researcher explains further that interest could be regarded as the condition of wanting to know or learn about some object and also, as the trait which arouses concern or curiosity which holds ones attention on an object. Udegbe (2019) described interest as a

disposition, attitude and feelings of an individual towards an activity, which shows behaviorally, the extent at which the person likes to, participate in the activity. Any student with positive attitude towards Mathematics, studies the subject because he likes or has pleasure in it. Such student derives pleasure from acquiring Mathematical concepts. The reason is that students are likely to work diligently and most effectively at task in which they are genuinely interested. Thus, any student who has genuine interest in Mathematics might develop a positive attitude towards the subject, since interest and attitude are much more related. Obodo (2017) noted that there is generally low interest in the study of Mathematics and Mathematics related disciplines at all levels of education in Nigeria. The subject demands regularity. It is a sequence subject, and if a student is absent in it even for a few days, the sequence is broken and he fails to comprehend the subsequent steps. If students are given option; most of them will prefer not to have anything doing with the study of Mathematics. An irregular student cannot do well in the subject. Likewise, irregularity in home work also makes the students lag behind (Kulbir, 2012).

The revival or upsurge of studies in the relationship between cognitive and affective factors in Mathematics has really been seen in recent years. In particular, many reports have now been published on studies addressing the relationship between students' interest towards and achievement in Mathematics, gender differences in Mathematics interest, and the role that interest may play in explaining differences between boys and girls in their persistence with further study in the area (Willie, Abasi & Ojoko, 2025; Abasi & George, 2025; Abasi & George, 2025). While the results of these studies have been somewhat mixed, several studies have indicated significant relationships between interest and achievement in Mathematics during the early and middle school years. Given these findings, it is important that educators have access to instruments that are suitable for assessing mathematics interest in secondary school level students.

A number of self-report instruments have been developed to assess the level of academic interest and associations with academic performance among adolescents in Western countries (Dotterer et al., 2009; Kalender & Berberoglu, 2009; Linnenbrink-Garcia et al., 2010; Rotgans, 2015). Most of these scales were limited to measurement of emotion or value components in academic interest. Meanwhile, the measurement invariance of the instrument across subjects, time, genders, and grades has not been fully tested. In China, measures focus on subject-specific interest, such as mathematics learning interest questionnaire (MLIQ), (Wu & Liu, 2017) for junior high school students and sports learning interest scale (SLIS), (Lin & Chai, 2017) for primary and secondary school students, Academic Interest Scale for Adolescents (AISA), (Wu & Liu, 2020). Therefore, to provide effective prevention and intervention ideas for loss of interest among senior secondary school students, it is necessary to

develop a more comprehensive tool for assessing secondary school students' interest in Mathematics across different schools in Uyo Local Government Area of Akwa Ibom State.

Statement of the Problem

Opinions and experiences of Mathematics teachers in public secondary schools in Akwa Ibom State, Nigeria have shaped the understanding that many secondary school students do not have interest in Mathematics. Many students, the researcher spoke with, often tell her that they have "never been good at Mathematics" and they have "never liked Mathematics". Results of senior secondary school certificate examination in General Mathematics in Nigeria, May/June WAEC, and SSCE 2010 -2020 are evidence that students do not like Mathematics. Students' performance has been persistently low. The researcher feels that students' feelings about Mathematics and students' self-concepts about Mathematical ability have strong influence in their engagement in Mathematics classes and their interest in studying Mathematics. Therefore, this study considers the need to fashion out a standardized Mathematics interest scale to diagnose the interest level of the students so as to motivate students to love and have interest in learning Mathematics. This study, therefore, is designed to develop and validate a standardized Mathematics interest scale with the view of ensuring that the items in the bank are calibrated and are of high quality.

Research Questions

1. Does Mathematics interest scale have acceptable reliability index?
2. What is the nature of relationship existing between mathematics interest, attitude, motivation and achievement in Mathematics?
3. To what extent do students' personal characteristics and Mathematics interest relate?

Methods

Instrumentation research was adopted for this study. Instrumentation is a process of developing or pooling of items, testing them and using them. The researcher will not manipulate the variables in the study, since their manifestations have already occurred. That is, the Mathematics interest items to be used, age of students, class of schooling, gender of the students that will be used and parents' socioeconomic status, already exist and will not be manipulated in the study. The study was conducted in Uyo educational zone of Akwa Ibom State. The study area has different educational institutions both private and public. It has early childhood programs, that is, Crèche, kindergarten, primary, secondary and higher institutions. It is on the premise of these public secondary schools and families resident in the study area that necessitated this study on influence of parental factors on educational

aspiration of secondary school students in Uyo Local Government Area. The target population of this study is all the SS two students spread across the 14 secondary schools of Uyo Local Government Area in the 2024/2025 school session. JSS one to three as well as SS one and three students will not be considered for this study because JSS one & some SS one students were very new in the school and might not have been taught Secondary school level Mathematics yet and by some of the teachers in the school while JSS Three and SS three students were more psychologically concerned and preparing for their external examinations.

A total of 4 schools and 600 students were selected as sample respectively for the study. The unit of measurement for the study was the student. This study adopted a multi-stage sampling technique in the selection of the respondents. There are four clans in Uyo Local Government Area vis Etoi Clan, Ikono Clan, Offot Clan and Oku Clan and there are fourteen (14) secondary schools spread across the four clans. In stage one, secondary schools in Uyo L.G.A were stratified into the four clans. In stage two, one (1) secondary school was randomly selected from each clan resulting in 4 schools. Stage three involved the use of simple random sampling to select 150 SS2 students from each of the selected schools.

Five instruments were used for data collection in this study. These are: Mathematics Interest Scale (MIS)**,** English Language Interest Scale (ELIS)**,** Students' Mathematics Motivation Scale (SMMS)**,** Attitude towards Mathematics Scale (AMS)**,** Mathematic Achievement Test (MAT). The instrument, Mathematics Interest Scale (MIS) was developed by the researcher, which proceeded in a number of identifiable stages in accordance with the principles guiding the development of valid instruments. Other areas of information that were sought from the literature and the focus group discussion were included. A total of 86 items were generated to form MIS. The scale is divided to two sections, section A and B. Section A seeks information about the students' background ranging from the students' gender, age and the socio-economic status of their parents while section B consists of 86 items that will be generated to measure the interest of the students in mathematics.

In developing the English Language Interest Scale, items for the survey were created to measure the students' interest in a task recently completed during regular English class time. This scale contained twelve items and resulted in a subset of items for use as a task interest scale. The scale contains items focused on measuring student interest in the English speaking and vocabulary review activities. Questions bordering on Students interest in English language class, reading of English language textbooks, reactions and preparations towards English

language examination and test was raised and students were asked to rate each interest statement on a 4-point Likert scale from 1- Not true at all, 2-Almost true of me, 3- True of me and 4- Very true for me.

Students' Mathematics Motivation Scale was developed by the researcher to measure the level of students' motivation towards mathematics. It was made up of two sections; A and B. Section A contains 4 items on bio-data. Section B contains 11 items using a four-point scale of SA= Strongly Agree A= Agree D= Disagree SD= Strongly Disagree on different facets of motivation such as mathematics identity, self-efficacy, and interest. Content validity was established by experts in educational guidance and counseling. Based on their suggestions and comments, the necessary corrections will be made. Reliability coefficient using Cronbach alpha was obtained for the instrument. All the items in section B was coded 1, 2, 3 and 4 for very dissatisfied, dissatisfied, satisfied and very satisfied respectively. However, the negatively worded items had their coding reversed.

To measure students' attitude toward mathematics, three factors; like mathematics (LM), value mathematics (VM), and confidence in mathematics (CM), which were covered by 17 items were adapted from (Martin et al., 2020). LM comprised nine items, VM consisted of five items, and CM included five items as well. The items used a 4-point Likert scales ranging from agree a lot (1point) to disagree a lot (4points). Some items were reverse coded to indicate that the higher score indicated a more positive attitude toward mathematics. The Cronbach's alpha coefficient was used to determine the reliability of the scale.

Mathematics Achievement Test (MAT) was developed by the researcher to test students' achievement in five selected topics in mathematics. It comprised of two sections; A contains 4 items on bio-data. Section B contains 55-items multiple choice objective test. A table of specification was drawn for the items to reflect the levels of behavioural objectives: - computation, comprehension, application, and analysis as shown in the Table of specification. (Umoinyang, 1997). The researcher will start with a pool of 55 items developed following the principle of test construction. The draft copy of the pool of items will be revised by two mathematics teachers in senior secondary school, each of whom will be given a copy of the draft and a covering report form. The form will request for the comments of the teachers on the adequacy of the items in terms of content, clarity of instruction, adequacy of time allowed, appropriateness of language and correctness of the key for each item. Based on their reactions, some of the items will be substituted with new ones and some will either have their stem or options modified. Thereafter, the pool of items will be administered to two hundred (200) SS2 students who will not be part of the sample of study. Their responses to the items will be scored, followed by item analysis using discriminating power and difficulty index to select the best 50 items that will constitute the MAT. The 50 selected items were those

with positive discriminating power of 0.30 and above and difficulty index range of 0.40 to 0.60. Reliability coefficient for the MAT will be determined using KR-20.

The researcher critically examined the items for correctness to ensure that the indicators are well represented in the draft items. To establish content validity, experts in the area of educational evaluation including researcher's supervisor examined the extent to which the items measured students' interest in mathematics. Their suggestions were used to restructure and modify of some of the items. There was an outright deletion of some items where they are duplicated, and new ones were generated where necessary. The face validity, in terms of the appearance, organization and typing format of the scales will be examined at this stage. The items were again given back to these experts for final screening. After the initial content validation, the pool of items were printed and then administered to the target participants for trial testing.

The scale was administered to selected sample of 200 respondents from two schools sampled for this study by the researcher. The schools were different from the schools that were used for the study. Also, to ensure uniform administration conditions across the schools, the researcher was guided properly by specific sampling procedure. Letter of introduction was collected from the Department for ease of entry into the schools that were used for the study. Results from the trial testing were also used to modify the main instrument before administration.

The Mathematics Interest sub-scales were established using factor analysis. The purpose of factor analysis in the construction of the scale is to "examine the stability of the factor structure and provide information that facilitated the refinement of the subscales. At this stage, the researcher will establish the factor structure or dimensionality of the construct. Principal component factor analysis with orthogonal Varimax rotation will be used to analyze the data in order to determine the number of underlying factors.

The internal consistency of the scales was estimated using the Cronbach reliability coefficient alpha (α) and Kuder-Richardson 20 (K – R 20). A high alpha is desirable since it reflects that the items are homogeneous and thereby measuring the same underlying property. In the achievement test, the items are dichotomously scored (right or wrong), its main concern is in the consistency of candidates, scores across the test items thus K – R 20 is more suitable. Nunnally and Bernstein (1994) suggest that an alpha level of at least 0.80 is sufficient for most purposes given that correlations are attenuated very little measurement error at that level. Furthermore, DeVellis (1991) stated that alpha values between .80 and .90 should be considered very well. Therefore, in this study the suggestions of Nunnally and Bernstein (1994) and DeVellis (1991) was considered.

There were five instruments used in this dissertation. The first four instruments were 4-point Likert Scale. The first and third scale (Strongly Agree, Agree, Disagree, Strongly Disagree), the second scale (Very true of me, True of me, Almost true of me, Not true of me), the fourth scale (All the time, Most of the time, Some of the time, Not at all) questionnaires on mathematics interest, English Language interest, Mathematics motivation and Attitude towards Mathematics variables. Items with mean rating of 2.50 and above was regarded as indicative for effective while items with a mean rating below 2.50 was regarded as indicative for ineffective in each of the students' Mathematics interest, English Language interest, Mathematics motivations and attitude towards Mathematics items. The fifth instrument measured Mathematics achievement (Optioned A – D). The 50 selected items were those with positive discriminating power of 0.30 and above and difficulty index range of 0.40 to 0.60. Reliability coefficient for the MAT was determined using KR – 20 while reliability coefficient for the scales (MIS, ELIS, SMMS and AMS) will be determined using Cronbach alpha.

The components of the final scale were identified alongside the total number of items in the subscales that were all together form the final scale. The final scale was administered by the researcher on the 600 students selected from the four secondary schools in the study area.

The instruments were administered by the researcher by visiting each of the sampled schools. The researcher obtained permission from the principals of the selected schools to conduct the research in their schools after giving him/her the letter of introduction gotten from the Faculty of Education, AKSU. The researcher sampled the Senior Secondary Two (SS2) students and thereafter, administered the instruments to the students with the help of either the compound master or the class teacher. It took the researcher some weeks to go round all the listed schools to administer and collect the data. The collected data were analyzed using Cronbach alpha and multiple regression analysis.

Results

Research question one: Does Mathematics interest scale have acceptable reliability index?

Table 1: Reliability Statistics of Mathematics Interest Scale

Instrument	Mean	Variance	Std. Deviation	No. of Items	Cronbach's Alpha
Mathematics interest scale	343.41	2021.15	44.96	83	0.963

The outcomes of reliability analysis on the scales of the Mathematics Interest Scale were achieved using Cronbach reliability coefficient alpha (α). A high alpha (α) is desirable since it reflects that the items are homogeneous and thereby measuring the same underlying property. Nunnally and Bernstein (1994) suggest that an alpha level of at least .80 is sufficient for most purposes given that correlations are attenuated and there is very little measurement error at that level. Furthermore, DeVellis (1991) stated that alpha values between .80 and .90 should be considered very good. Therefore, in this study the suggestions of Nunnally and Bernstein (1994) and DeVellis (1991) were considered and the reliability index of the Mathematics interest scale found to be 0.963 in this study is highly acceptable.

Research question 2: What is the nature of relationship existing between mathematics interest, attitude, motivation and achievement in mathematics?

Table 2: Analysis on Nature of Relationship Existing Between Mathematics Interest, Attitude, Motivation and Achievement in Mathematics.

Variables	Mathematics Achievement Score	Mathematics Interest	Motivation towards mathematics	Attitude towards mathematics
Mathematics Achievement Score	1	0.000[b]	.004	0.003
Mathematics Interest	0.147[a]	1	0.000	0.000
Motivation towards mathematics	0.110**	0.666**	1	0.001
Attitude towards mathematics	0.116**	0.190**	0.127**	1

** Correlation is significant at the 0.05 level (2-tailed)
a p – value for the correlation.
b Index of correlation (r) between the instruments.

Table 2 presents an inter correlation matrix of Pearson Product Moment correlation coefficients that showed the correlation/relationship among the four variables (Mathematics Interest, Motivation towards mathematics, Attitude towards mathematics and Mathematics Achievement Score). For each of the variables, the r-value and the significance level (two parameters) are shown. There were positive correlations between the variables. For example, the correlation coefficient between achievement in mathematics and mathematics interest is positive and significant (r = 0.147; p = 0.00), indicating that the more interested a student is in mathematics; the better his/her achievement is in mathematics.

The correlation coefficient of motivation towards mathematics and achievement in mathematics is also positive (r = 0.11; p = 0.004), although low indicating a positive relationship between motivation towards

mathematics and achievement in mathematics. As the students' motivation towards mathematics increased, mathematics achievement also increased.

The relationship between students' attitude towards mathematics and their mathematics achievement score is also positive and significant (r = 0.116; p = 0.003) while the relationship between motivation towards mathematics and students' interest in mathematics is positive, large and significant (r = 0.666; p = 0.000). From the correlation matrix of variables, there was glaring proof that all the four variables correlated with each other. The variables all together allow reliable prediction of achievement in mathematics.

Research question three: To what extent do students' personal characteristics and mathematics interest relate?

Table 3: Influence of Personal Characteristics on Mathematics Interest

S/N	Variables	Coefficients (Linear)
1	Sex	0.065
		(1.530)
		(4.113)
2	Family Size	-0.027
		(-0.661)
		(3.756)
3	Age	-.036
		(-0.857)
		(1.662)
	Constant	363.864
	R	0.073

Note: Values in the middle represents t-values while values in the last parenthesis represent standard error.

Multiple regressions were performed to examine if there is any influence of selected personal characteristics of the respondents (sex, family size and age) on the mathematics interest of the respondents. Table 3 shows that all the three (3) independent variables taken together had some level of influence on the variance in the mathematics interest of the respondents (R = 0.073). From the table also, only 0.5% variance in mathematics interest was accounted for by the three (3) independent variables.

Discussion of Findings

Findings on the reliability index of Mathematics interest scale using Cronbach alpha (α) estimate for the determination of internal consistency gives a value of 0.963, which is an indication that the instrument is reliable. The Finding of the study showed that reliability of the Mathematics interest scale has specify the degree of accuracy, dependability or consistency with which the test measures the variable it is intended to measure which is in line with Thorndike (1990). The Findings also revealed that the items generated for the scale actually did measured interest of the students in the Mathematics. The individual items were properly targeted and the co coefficient is squared to

obtain the proportion of variance between two variables or between obtained score and true score as the case may be, the internal consistency would yield about 50% of shared variance. We can conveniently say that the items generated for the scale actually did measured interest of the students in Mathematics. The individual items were properly targeted and they collectively did the measurement of the construct. It is revealed from the findings of this study that the Mathematics interest scale has an acceptable reliability index. This agrees with a study by Nunnally and Bernstein (1994) and Devellis (1991) stated that alpha (α) value between 0.80 and 0.90 is considered very good. It was therefore concluded that the mathematics interest scale has acceptable reliability index.

Finding on the nature of relationship existing between Mathematics Interest, Attitude, Motivation and Achievement in Mathematics shows that the correlation coefficient between achievement in Mathematics and Mathematics interest is positive. This indicates that the more interested a student is in Mathematics, the better his/her achievement in Mathematics. This finding is in line with the study of Middleton & Spanias (1999) stating that successful students are often those who attribute their success to ability whereas unsuccessful students are those who attribute failure to lack of ability. The finding also agrees with Willie, Abasi and Ojoko, 2025; Abasi and George, 2025; Abasi and George, 2024 who all reported positive relationship between students' interest in Mathematics and their achievement in Mathematics. Further finding on the study showed that there is a positive relationship between Motivation towards Mathematics and achievement in Mathematics. As the students' motivation towards Mathematics increased, mathematics achievement also increased. This is also in line with the report of study conducted by Babayemi, Akpan & Abasi (2022) whose findings showed that students' motivation significantly influenced their academic performance.

Findings on the study shows that sex, family size and age taken together had some level of influence on the variance in the Mathematics interest of the respondents (R = 0.073; r = 0.005). Students' sex has significant effect on Mathematics interest of the students. This finding corroborates the works of Ekpo, Utibe and Udofia (2024), who found a significant influence/interaction of students' gender on academic performance. This finding is in contrast with the works of Sunday, Umanah and Udofia (2025) and Edem, Akpan and Udofia (2023) who found that students' gender had no significant effect on learning effectiveness. However, further analysis of the study revealed that male students were more effective in learning of Mathematics than their female counterparts. This is in consonance with Abasi and Ekwueme (2025) who had earlier reported that female students were more capable than males in handling Mathematics problems. The slightly higher interest in Mathematics reported by male students in this study found explanation in the common belief that females are less mathematically capable than males.

Conclusions

Mathematics Interest Scale for secondary schools students constructed, validated and put to use is reliable in determining the interest of students in mathematics. This study has shown that students especially in secondary schools in Akwa Ibom State can be relied upon to give some credible judgment with regards to their interest especially those that are known to them. Students' personal characteristics such as sex, family size and age have some level of influence on the variance in the mathematics interest of the Secondary School Students.

Recommendations

Based on the findings, it is recommended that:

1. The school management staff should adopt the validated instruments that could be used during monitoring and supervision exercise to monitor and evaluate the receptivity of mathematics by the students and teaching effectiveness of teachers. This becomes necessary in order to give them feedback which could engender corrections and improvement.
2. The academia should provide professional development opportunities for Mathematics teachers to learn more about Mathematics Interest and the impact in the evaluation of learning and teaching effectiveness of mathematics in secondary schools in Akwa Ibom State.
3. Students should be encouraged to develop mathematics interest, attitude, and motivation towards the learning of mathematics in senior secondary schools.
4. Conferences and seminars should also be organized for teachers on how their classroom interactions could be further enhanced to capture the interest of students towards mathematics.
5. The validated instruments/scales should be adopted or adapted by researchers for use in private secondary schools, Colleges of Education and in other institutions where adolescence constitute the bulk of the students in Nigeria.

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