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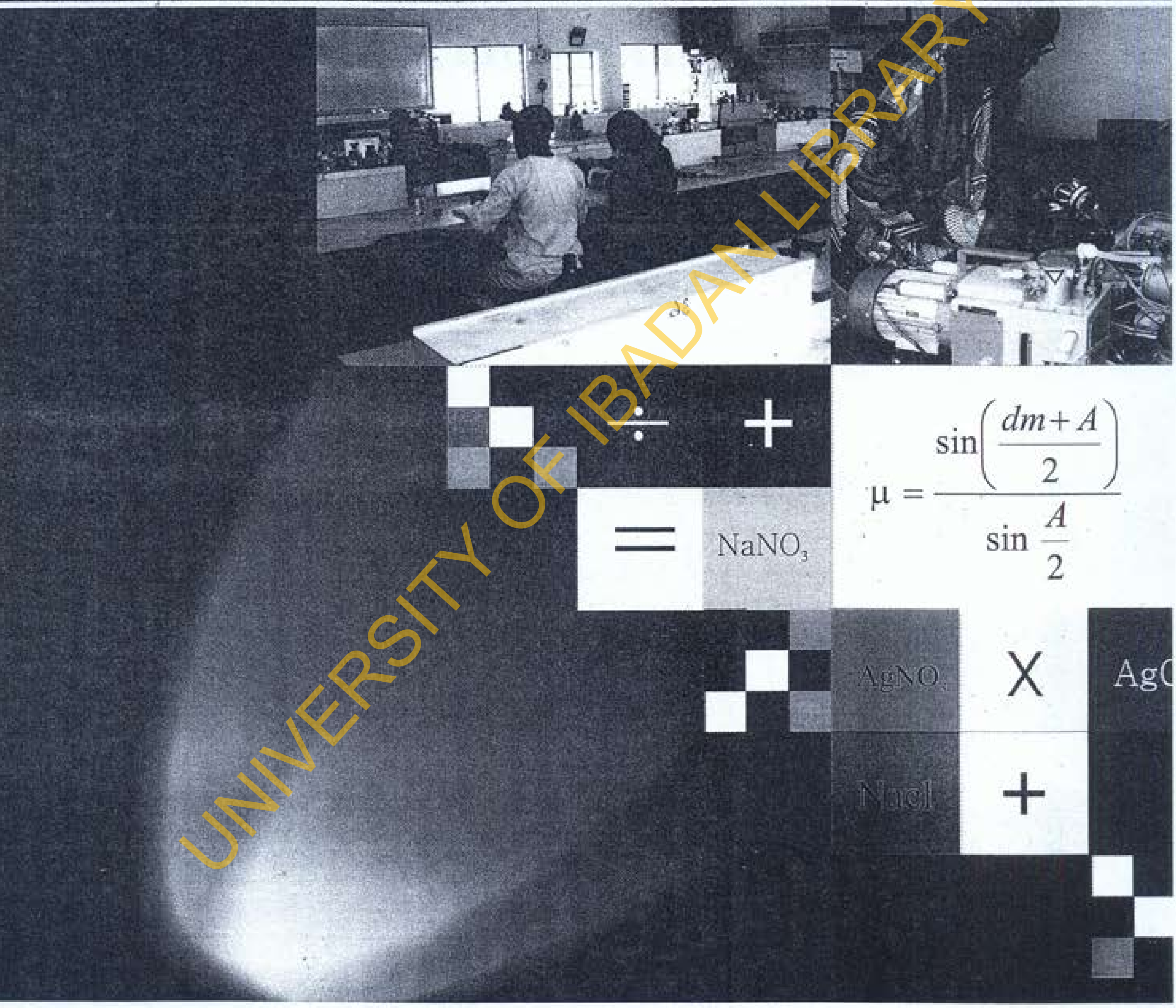

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TEACHER FACTORS AS CORRELATES OF STUDENTS' ANXIETY IN JUNIOR SECONDARY SCHOOL MATHEMATICS: A STUDY IN SCHOOL EFFECTIVENESS

Dr. J. Gbenga Adewale

Abstract
Students' mathematics anxiety is one of the problems in the secondary schools which make them not to perform optimally in mathematics achievement tests. Teachers have been seen as a single factor that can increase or reduce students' mathematics anxiety. Therefore this study examined the composite and relative contributions of five teacher factors (teacher qualification, gender, behaviour, expectation and attitude) to students' mathematics anxiety. The study adopted a survey research of the expo facto type. A multistage sampling technique was employed to obtain a sample of 54 JSS mathematics teachers and 1,620 JSS 2 students in 54 schools in Oyo State. Two instruments used in this study were the Mathematics Anxiety Rating Scale (MARS) and Teacher Questionnaire (TQ). The data collected were subjected multiple regression analysis. The combination of the predictor variables: qualification, gender, behaviour, expectation and attitude explained 68.7 percent of the variance in students' anxiety in mathematics *as shown by the coefficient of determination (R^2 = 0.838). The relative contributions of each of the three predictor variables shows that teacher attitude (β = -0.282, $p < 0.05$) had the highest contribution, teacher qualification (β = -0.133, $p < 0.05$), teacher classroom behaviour (β = -0.101, $p < 0.05$), teacher expectations (β = 0.102, $p < 0.05$) and teacher gender (β = 0.010, $p >$ 0.05. The potent predictor variable to students' mathematics anxiety is teacher attitude; therefore, teachers should be friendly in their approach as students tend to learn better in a tension free or friendly environment.*

Keywords: student's anxiety in mathematics, school effectiveness, teacher attitude, teacher expectation, teacher classroom behaviour, teacher qualification

Introduction
Mathematics is useful virtually in all subjects because all fields of knowledge are dependent on it for solving problems and predicting outcomes (Adewale, 2008). May (2003) affirms that the great book of nature can be read only by those who know the language in which it was written. He concluded that the language is mathematics. He added that mathematics is the way to understand all sorts of things in the world

around us. In explaining the importance of Mathematics. May used an interesting illustration of Swiss victory in the 2003 America's Cup. Switzerland is a small, mountainous, land-locked country. Switzerland won the cup because Swiss has a very strong tradition in mathematics--Euler's picture appeared on a Swiss 10 franc note--and the Swiss team wisely brought this strength in mathematics to bear on the America's Cup challenge. In corroborating the views of May, Osokoya (2005) asserts that mathematics is regarded as a language of science. Awofala (2000) also affirms that mathematics is a fundamental science for the understanding of most other fields and an integral part of the world's culture. Okebukola (1992) referred to Mathematics as the central intellectual discipline of the technological societies.

Osokoya (2005) observed that mathematics being the basic science whose thorough knowledge is fundamental to the understanding of the other sciences has a most significant role to play in the cultivation of any sustainable scientific tradition and technological development in Nigeria. Since mathematics is so important, the Federal Government of Nigeria made it a core and compulsory subject at the secondary school level of education in Nigeria as contained in the National Policy on Education (FRN, 2004). The National Policy on Education also states that the broad goals of secondary education should be (i) preparation for useful living within the society and (ii) preparation for higher education. With particular reference to the aims and objectives of secondary education, the general objectives for Mathematics Education as contained in the National Policy on Education (FRN, 2004) are:

> *to generate interest in mathematics and to provide a solid foundation for everyday living; to develop computational skill; to foster the desire and ability to be accurate to a degree relevant to the problem at hand; to develop precise, logical and abstract thinking; to develop the ability to recognize problems and to solve them with related mathematical knowledge; to provide necessary mathematical background for further education; and to stimulate and encourage creativity.* (pp. 13-14).

Furthermore, the unique importance of Mathematics is epitomized in the British National Curriculum (2000) thus:

> *Mathematics equips pupils with uniquely powerful tools to understand and change the world. These tools include logical reasoning, problem-solving skills and the ability to think in abstract ways. Mathematics is useful, in everyday life, many forms of employment, science and technology, medicine, the economy, the environment, development and in public-decision making (p. 17).*

In spite of the recognition given to Mathematics as a pivot upon which technological and economic development rest, Awofala (2002) points out that there have often been gaps between curriculum planners' intention and what goes on in Mathematics classroom. Adetunji (2000) and Akinsola (1999) attribute the problems hindering students' achievement in mathematics in Nigerian schools to teachers' inability to help students learn mathematics in a meaningful way. Other reasons advanced for students' poor performance in Mathematics include: lack of adequate teaching materials, poor presentation by the teachers, uncooperative attitude of the students and large class size (Ifamuyiwa, 2005). Other reasons are; shortage of qualified and effective Mathematics teachers (Ojo, 2003 & Akinsola, 2000) and shortage of Mathematics textbooks that suit the comprehension level of students in secondary schools (Onabanjo, 2004).

More importantly among the factors that inhibit students' achievement in mathematics is mathematics anxiety. Many students (young and adults) have fear and loathsome experiences about Mathematics (Burns, 1998). These negative experiences are caused by mathematics anxiety, which knows no boundaries regarding race, age or gender. One of the most notable consequences of mathematics anxiety is poor mathematics achievement and competence (Ashcraft, 2002). Part of this is because students with mathematics anxiety attempt to cope with the devastating effects of their anxiety by circumventing mathematics in school. This in turn can lead to limited number of graduates in Mathematics, and ultimately limited career choices in mathematically related disciplines. The anxiety, which is not significantly related to intelligence, has been shown to inhibit student learning (Ashcraft, 2002) and to reduce working memory capacity (Ashcraft & Kirk, 2001; Beilock & Cart, 2005; Shobe, Brewin & Carmack, 2005), which in turn has a major impact on students' self-confidence with respect to mathematics.

Mathematics anxiety is often the result of repeated negative experiences related to mathematics (Kogelman, Nigro, & Warren, 1978). It is a conditioned fear that develops into a philosophical attitude, which becomes a self-fulfilling prophecy that reinforces one's beliefs about an inability to perform mathematically. For those who suffer from mathematics anxiety, physiological symptoms such as sweaty palms, nausea, muscle contractions, difficult breathing, tightness in the throat, headaches, heart palpitations, restless behaviour, forgetfulness, and a temporary boost in one's heart rate are familiar. The cognitive theory of test anxiety has three common elements. The first is that high levels of test anxiety are believed to adversely influence students' self appraisals and appraisals of evaluative situations. Second, test anxious students are hypothesized to engage in more negative thoughts (negative internal dialogue, during evaluative task). Third, students' performance attributions are believed to be influenced by high level of test anxiety.

Anxiety in general is used in response to a perceived threat to an individual (Barnes, 1984). The threat may be real or imagined and for those who are unable to avoid the threat, feelings of distress, confusion and fear are experienced (Barnes 1984). Mathematics anxiety has been defined as the feeling of tension, helplessness, mental disorganization and dread one has when required to manipulate numbers and shapes and the solving of mathematical problems (Ashcraft and Faust, 1994). The special characteristics of Mathematics anxiety can be described as 'the feelings of uncertainty and helplessness in the face of danger.

Mathematics anxiety has been related to teachers and the classroom setting. Mathematics anxious children often show signs of nervousness when the teacher comes near, freezing and stopping work or covering it up to hide it (Barnes 1984). One of the findings of Newstead (1998) is that children between the ages of nine and eleven reported a significant amount of anxiety about the social, public aspects of doing Mathematics in the presence of their teachers and peers in the classroom.

In order to alleviate mathematics anxiety in the classroom, teachers' attitudes, curriculum, pedagogy, the classroom culture, and assessment must be considered. Apart from anxiety derivable from school setting, Mathematics anxiety can also be perpetuated in the home, in society. However, the focus of this study is that aspect that relate to teachers and what goes on in the classrooms. Students at all grade levels can experience mathematics anxiety and they attest to similar characteristics and consequences. Jackson and Leffingwell, (1999) discover that sixteen percent of the students they studied were first traumatized mathematically in third or fourth grade. The difficulties in fourth grade arose from ideas such as fractions, timed tests, and memorization of multiplication tables and formulas.

Teachers at this level were blamed for hostile behaviour, making derogatory comments when children did not understand concepts, appearing angry when asked for additional help, displaying insensitive and uncaring attitudes, stereotyping females as not needing mathematics. At this level, students felt their anxiety developed from aspects such as angry teacher attitude, unrealistic teacher expectations, teachers ridiculing students in front of peers, gender bias, and what they term as "drill and kill" worksheets.

Teacher attitudes greatly influence mathematics anxiety (Harper & Daane, 1998; Ruffell, Mason, & Allen, 1998). Ruffell, et al. (1998), state that the most dominant factor in moulding student attitudes is teacher attitudes. Good (1979) states that teachers impact students' achievement more than either curriculum or teaching methods.

Apart from teacher attitude, teacher qualification is another variable that could increase or inhibit students' anxiety in mathematics. Students' of teachers with low qualification may suffer from anxiety because such teachers may develop inferiority complex and they may transfer their woes on their students by being harsh on them.

In the same vein, teachers with high level of qualification tend to be sympathetic and may want to show the students the way up.

Teacher classroom behaviour is another factor that could promote or inhibit mathematics anxiety. The beginning of anxiety can often be traced to negative classroom experiences and the teaching of Mathematics (Williams, 1988). It is considered critical to examine classroom behaviour and establish whether the roots of Mathematics anxiety may be in instructional methods and in the quality of mathematics teaching (Newstead, 1998). Greenwood (1984) states that the principal cause of Mathematics anxiety lies in the teaching methodologies used to convey basic mathematical skills. He asserts that the "explain – practise – memorize" teaching paradigm is the real source of the Mathematics anxiety syndrome. He states that teachers create anxiety by placing too much emphasis on memorizing formulae, learning mathematics through drill and practice, applying rote-memorised rules and setting out work in the traditional way. In this study classroom behaviour is described as methods of reinforcement used by teachers during teaching. Rewarding, according Hough (1967 in Zimmerman (1970)) tend to facilitate student's achievement and attitudinal development. Similarly, teacher classroom behaviour like punishing has been shown to inhibit students' achievement (Soar 1967 in Zimmerman (1970)) and to create anxiety. The conclusion drawn by Zimmerman (1970) is that since teacher classroom behaviour exerts reinforcement effects on students' behaviour and since anxiety response can be manipulated according to conditioning principles, then the net level of teacher reward would correlate inversely with classroom levels of anxiety.

Teacher expectation is another variable that can influence students' anxiety. In this study, teacher expectations are explained as the hopes teachers hold for their students in terms of the students' capability to learn and achieve in mathematics. It has been suggested that "teacher expectations often do play a role in student achievement" (Cooper, 2000: 339). Since the highly influential study of Rosenthal and Jacobson (1968), many studies have addressed the issue of self-fulfilling prophecy in terms of an erroneous teacher expectation that leads to behaviour that "causes the expectation to come true" (Good and Brophy, 1994: 84). Rosenthal and Jacobson's research examined the relationship between teacher expectations and student achievement. At the beginning of the school year they gave students an achievement test and informed teachers that based on the results of the examination, some students showed potential for high academic achievement in the forthcoming school year. However, these students were chosen randomly, not on the basis of their test scores. At the end of the school year, these students showed greater gains in IQ scores than other students in the same classrooms. The researchers' explanation was that the artificial expectations imposed on the teachers seem to have influenced teachers' behaviour towards these students, in such a way that they enjoyed greater gain in achievement, and produced a 'self-fulfilling prophecy' effect (Kyriakou, 1997).

Despite the fact that the original Rosenthal and Jacobson's study received criticism because a) their results were not always confirmed in subsequent research by other researchers, and b) the study did not include classroom observation, their study nevertheless helped researchers realize and appreciate the role of affect in cognition. Moreover, it prompted them to focus on affective variables, such as self-esteem, inhibition, motivation and anxiety, in the study of second and foreign language acquisition (Andres, 2002). The concept of self-fulfilling prophecy as applied in educational contexts states that students will live up or down their teachers' "expectations, predictions, or preconceived notions" regarding their behaviour and academic performance (Boehlert, 2005: 491). If students do not live up to teachers' expectation, such students are likely to develop anxiety. The process of the teacher expectation as stated by Brophy, 1985; Covington, 1992 involves the formation of expectations on the basis of some characteristics (e.g. students' previous achievement, socioeconomic background). Second, based on these expectations, teachers behave differently to various students. For example, teachers may provide fewer clues to low achievers (Levin and Nolan, 1996). Third, teacher expectations are conveyed to students. Gender of teacher is another factor that can influence students' anxiety in mathematics.

It is postulated in this study that girls taught by female teacher are likely to overcome anxiety in mathematics because girls are likely to be patterned after their female teachers. Before any teacher specializes in mathematics at higher level, such a teacher must have overcome anxiety in mathematics. It can also be said that female teachers who are strong with mathematics and comfortable with teaching it to students are likely to have an enhanced positive effect on girls' perceptions of mathematics and their performance in it.

Many studies have considered each of these teacher factors either singly or in combination of two, but this study examines the five identified teacher factors (teacher gender, qualification, classroom behaviours, expectation and attitude) as correlates of students' anxiety in junior school mathematics. The following research questions were developed to guide the study:

1. What proportion of variance in students' anxiety is accounted for by the linear combinations of teacher factors (teacher gender, qualification, classroom behaviours, expectation and attitude)?
2. What is the relative contribution of teacher gender, qualification, classroom behaviours, expectation and attitude in the prediction of students' anxiety in mathematics?
3. Which of the teacher factors is the most potent predictor of students' anxiety in mathematics?

Methodology

Population, Sampling and Sample

This is a survey which used a target population of all mathematics students in junior secondary schools 2 (JSS 2) and their teachers in Oyo State. The study adopted a multistage stratified random sampling technique. The sampling was at four levels: the senatorial districts level; the local government areas (LGAs); school and subject levels. Stratified random sampling technique was extensively used in selecting samples for the study. This sampling technique was used because stratification increases the reliability of survey estimates; improves efficiency of the sampling technique; allows the use of different sampling techniques for a single study; and ensures adequate representation of specific groups in a target population.

As at the time of this study, there were 33 LGAs in Oyo State, stratified into three senatorial districts. From each district, three LGAs were randomly selected. In all, a total of nine LGAs participated in the study. Sampling at school level was done by collecting a list of all secondary schools from the Oyo State Ministry of Education. Six schools were randomly selected in each LGA. Sampling at participant level (students) was done using simple random sampling technique to select thirty (30) students at JSS 2 level. In addition, mathematics teachers who were directly responsible for teaching the selected students were involved in the study. In all, 54 mathematics teachers and 1,620 JSS 2 students in 54 schools participated in the study.

Instrumentation

The instruments used in this study are: Mathematics Anxiety Rating Scale (MARS) and Teacher Questionnaire (TQ).

Mathematics Anxiety Rating Scale (MARS)

MARS is an instrument designed to determine the participants' mathematics anxiety level. Mathematics anxiety was measured through the use of an adapted version of Mathematics Anxiety Rating Scale (MARS) developed and used by Beaslye, Mark, Jeffrey and Natali (2001) Hopko (2003) and Awolola, (2009). The MARS has two sections, A and B. Section A is designed to elicit responses in relation to participants' age, gender and name of school. Section B consists of twenty (24) items based on five point scale ranging from 1 = not at all to 5 = very much.

Not at all $\longleftarrow$ 1 2 .... 5 $\longrightarrow$ Very much

For each of the items, student is expected to indicate how much each of the items frightens him/her. Some of the items in MARS are, cringing in terror about mathematics, uneasiness in mathematics class, short-time retention of mathematics concepts, zoning out in mathematics class, mathematics phobia, studying for mathematics test/exam, inferiority complex. The higher the scores on MARS, the more anxious the students are and the lower the score the less anxious the students are. Although, each of the earlier researchers validated the scale before they used it, it became necessary to revalidate the instrument because of cultural and level of students on which the instrument was used. The instrument was validated using a group of 50 JS 2 students from Atiba Local Government not included in the sample and a measure of internal consistency and construct validity (Cronbach alpha) was used to establish a reliability coefficient of 0.87. The value is high enough to warrant the use of the instrument in the study.

Teacher Questionnaire

The teacher questionnaire was designed to gather relevant information on the mathematics teachers in the selected schools. The questionnaire is divided into three sections A, B C and D. Section A focused on background information on the teachers. Such information included teaching experience, teachers' highest educational qualification, and teacher specialization. Section B dealt with teacher expectation of students' achievement in mathematics. This is measured by teacher estimating the percentage of students that can solve problems in various topics covered in the class. The teacher picked one of these options (1 - 25% = poor, 26 - 50% = fair, 51 - 75% = good, 76 - 100% = excellent) to represent his/her expectations of students' ability in solving problems on the identified topics in mathematics. Teacher expectation was validated using a group of mathematics teachers not designed to participate in the study. A Cronbach estimate of 0.79 was established to indicate the internal consistency and construct validity of teachers' expectation of students' ability in mathematics. Section C dealt with teacher attitude. Teacher attitude is measured by teachers' friendliness, cheerfulness, willingness to help students solve their mathematical problems. The instrument has a 4 point scale: poor = 1; fair = 2; good = 3 and excellent =4. Students were asked to rate their teacher on a continuum poor to excellent. A Cronbach estimate of 0.83 was established to indicate the internal consistency and construct validity of teachers' attitude. Section D deals with classroom behaviour which is measured by the amount of praise (reward or reinforcement) or punish a teacher gives to students. Students were asked to agree or disagree on teachers' classroom behaviour on reward or punishment on a 4-point Likert scale (Strongly Disagree = 1, Disagree = 2, Agree = 3 and Strongly Agree = 4). The reliability coefficient using Cronbach alpha was 0.81.

Administration, Collection of Data and Data Analysis

Guidelines for the conduct of the exercise were produced and used to train all the field officers to ensure uniformity of administration. Data were collected on school basis for editing and analysis. The SPSS software was used to analyze the data. Since students and teacher variables were used in the study, school was used as the unit of analysis an linear multiple regression was used for data analysis.

Results and Discussion

The three research questions are explained in this section.

Research Question 1

What proportion of variance in students' anxiety is accounted for by the linear combinations of teacher factors (teacher gender, qualification, classroom behaviours, expectation and attitude)?

Table 1 Composite contribution of the teacher factors to the students' mathematics anxiety

Multiple R	R2	Adjusted R Square	Std Error of the Estimate
.838	.702	.687	2.68

Table 2 Analysis of Variance

Source of Variation	Sum of Square	Df	Mean Square	F	Sig
Regression	2021.156	5	404.231	56.268	.000
Residual	344.832	48	7.184		
TOTAL	2365.988	53			

Significant at $P<0.05$

Results in Table 1 show that the combination of all the predictor variables: teacher factors (teacher gender, qualification, classroom behaviours, expectation and attitude) have a multiple correlation of 0.838 with students' anxiety in mathematics. However, the combination of these variables explained 68.7 percent of the variance in students' anxiety in mathematics as shown by the coefficient of determination ($R^2_{adj} = 0.687$). The $F_{(5;48)} = 56.268$ $P < 0.05$ shown in Table 2 reveals that there is a strong joint contribution of the teachers' factors and students' mathematics anxiety.

Research Question 2

What is the relative contribution of teacher gender, qualification, classroom behaviours, expectation and attitude in the prediction of students' anxiety in mathematics?

Table 3 Parameter Estimate

VARIABLE	B	SEB	Beta	Rank	T–Value	Sig
Teacher gender	0.568	0.079	0.010	5th	0.325	.745
Teacher qualification	-2.506	0.097	-0.133	2nd	-5.243	.000
Teacher classroom behaviour	-1.994	0.101	-0.101	3rd	-3.915	.000
Teacher attitude	-9.401	0.036	-0.282	1st	-11.154	.000
Teacher Expectations	1.673	0.017	0.102	4th	3.836	.000
Constant	5.932	0.982			6.038	.000

Table 3 reveals the relative contributions of the five teacher factors to the students' mathematics anxiety expressed as beta weights. The partial correlation coefficient of teacher qualification, behaviour and attitude has negative relationship with pupils' attitude towards mathematics. This implies that the teacher qualification, behaviour and attitude increases with reduction in anxiety. The positive value of the effects of teacher gender and teacher attitude implies that the variables correlate negatively with anxiety reduction. This means that students taught by female tend to be anxious than those taught by male teachers since male is coded 1 and female coded 2. In the same vein, high teacher expectation leads to high anxiety.

Research Question 3

Which of the teacher factors is the most potent predictor of students' anxiety in mathematics?

Using the value of partial correlation coefficient to determine the relative positions of the independent variables in the prediction of the dependent variable, Table 3 reveals that teacher attitude has the highest predictive value of -9.401 of the students' mathematics anxiety, followed by the teacher qualification (B=-2.506), teacher classroom behaviour B=-1.994), teacher expectation (B= 1.673) and the least is the teacher gender (B=0.568).

Discussion

Teacher attitude has the highest predictive value in the students' mathematics anxiety. The study shows that the more friendly a teacher is, the less anxious the students are. On the contrary, the less friendly a teacher is, the more anxious the students are. This is logical because an atmosphere of friendliness promotes relaxation and conducive environment for better interaction between students and their teachers. Questions on difficult concepts could be asked without the fear of rebuffs or criticisms. On the other have teachers with bad temper are likely to facilitate anxiety in the students. The study corroborates findings from previous study that teacher attitudes greatly influence mathematics anxiety (Harper & Daane, 1998; Ruffell, Mason, & Allen, 1998). Similarly, Ruffell, et al. (1998), stated that the most dominant factor in moulding student attitudes is teacher attitudes. It is assumed that if teachers promote students' confidence, perseverance, curiosity, and inventiveness by assigning appropriate and engaging tasks, it is likely that students' anxiety would be reduced.

Teacher qualification is the second factor that significantly predicted students' mathematics anxiety. The results also showed that students of teachers with low qualifications (less than Nigeria Certificate of Education – NCE and NCE graduates) are more likely to develop high mathematics anxiety than students of teachers with high qualifications (First Degree and above). It is logical to think that the quality of teachers is an important input in effective learning since quality output (in terms of free and friendly classroom) demands quality input (Manson, 1981). Darling-Hammond (1999) finds a significant positive association between achievement (which can be influenced in the absence of anxiety) and teacher certification; she also found a significant negative association between achievement and a high proportion of uncertified teachers in the school. If we assume that achievement can increase when anxiety is reduced, then we can illustrate several studies providing evidence that the students of certified teachers perform better than students of uncertified teachers. For example, Fuller and Alexander's (2004) analysis identified similar students who were taught by Texas physics teachers who were also similar except that some were certified and others were not. A study that examined the mathematics achievement of elementary students also found that students taught by new, uncertified teachers did significantly worse on achievement tests than did those taught by new, certified teachers (Laczko-Kerr & Berliner, 2002).

Teacher classroom behaviour is the third factor that significantly predicted students' mathematics anxiety. The results show that negative teacher behaviours promote students' mathematics anxiety. In this study classroom behaviour is described as methods of reinforcement used by teachers during teaching. The findings of this study corroborates those of Hough (1967) who indicated that rewarding tend to facilitate student's achievement and attitudinal development. Similarly, teacher classroom behaviour like punishing inhibits students' achievement (Soar 1967) and to create anxiety and the net level of teacher reward would correlate inversely with classroom levels of anxiety Zimmerman (1999).

Teacher expectation is the forth factor that significantly predicted students' mathematics anxiety. In this study, teacher expectations are explained as the hopes teachers hold for their students in terms of the students' capability to learn and achieve in mathematics. The findings from this study revealed that students whose teachers had high expectation developed high anxiety especially when such expectations are not met. In a converse situation, students whose teachers had low expectation were less anxious. The findings in this study corroborate those of Boehlert (2005) that if students do not live up to teachers' expectation, such students are likely to develop anxiety. Teachers do not just develop expectations on student, but teachers depend on some students' characteristics, for example, students' previous achievement, socioeconomic background (Brophy, 1985; Covington, 1992).

Teacher gender is the least factor in the prediction of students' mathematics anxiety. Although, there is no significant prediction of gender on students' mathematics anxiety, it is worth noting that there is an assumption that girls taught by female teacher at Junior Secondary School (JSS) level are likely to overcome anxiety in mathematics because girls are likely to be patterned after their female teachers. Before any teacher specializes in mathematics at higher level (JSS), such a teacher must have overcome anxiety in mathematics. It can also be said that female teachers who are strong with mathematics and comfortable with teaching it to students are likely to have an enhanced positive effect on girls' perceptions of mathematics and their performance in it. The positive relationship in this study shows that students taught by female tend to be anxious than those taught by male teachers.

Conclusion and Recommendations

This study examined the teacher factors (teacher gender, qualification, classroom behaviours, expectation and attitude) as correlates of students' mathematics anxiety. Using a sample of 54 teachers and 1,620 JSS 2 students in 54 schools it is discovered that four out of five predictor variables contributed negatively and significant to students' mathematics anxiety. The potent predictor variables to students' mathematics anxiety is teacher attitude followed by the teacher qualification, teacher classroom behaviour and teacher expectation; while teacher gender is positively correlated and not significant to the prediction of student's mathematics anxiety. It is concluded that students of teachers with bad temper tend to be anxious while students of good temperament tend to be less anxious. It is therefore recommended that teachers should be friendly in their approach as students tend to learn better in a tension free or friendly environment. Moreover, students of teachers with high expectation tend to be anxious and students of teachers with low expectations tend to be relaxed and they may not even be propelled to study. Teachers should have expectation and at the same time let the students be aware of the expectation and that the fact they do not meet expectation at a particular time does not mean that they cannot meet at another time. Students of teachers with first degree and above tend to be less anxious while students of teachers with less than first degree tend to be anxious, although, NCE is the minimum teaching qualification at JSS level, teachers are encourage to have a degree or acquire more degrees.

References

Adetunji, F.O. 2000. A Study of Some Nigerian Primary School Teachers' Attitude to Mathematics. *African Journal of Educational Research* 6.1 & 2: 93-99.

Adewale, G. (2008). Effect of Brainstorming on Students' Achievement in Junior Secondary School Mathematics: An Effort in Making Schools Effective. *Journal of Sociology and Education in Africa. 7(1), 203-218)*

Akinsola, M.K. (2000): Enriching Science, Technology and Mathematics Education: Effect of Resources Utilization on student's achievement in Geometry. *41st Annual Conference Proceedings of Science Teachers' Association of Nigeria.*

Akinsola, M.K. 1999. Factors Inhibiting The Learning of Mathematics in Obemeata, J.O.; Ayodele, S.O.; Araromi, M.A. Eds *Evaluation in Africa in Honour of Prof. E. A. Yoloye* Stirling – Horden Publishers (Nig.) Lt. 192-211.

Andres, V. (2002). The Influence of Affective Variables on EFL/ESL Learning and Teaching, *The Journal of the Imagination In Language Learning and Teaching*, 7(1).

Ashcraft, M. and Faust, M. 1994. Mathematics anxiety and mental arithmetic performance. An exploratory investigation. *Cognition and Emotion.* 8(2), 97-125

Ashcraft, M. H. (2002). Math anxiety: Personal, educational, and cognitive consequences. Current Directions in Psychological Science, 11(5), 181-185.

Ashcraft, M. H., & Kirk, E. P. (2001). The relationships among working memory, math anxiety, and performance. Journal of Experimental Psychology: General, 130(2), 224-237.

Awofala, A.O.A. 2000. The status of Mathematics Teaching and Learning in Primary School at the year 2000. *An Unpublished B.Ed Project. University of Ibadan.*

Awofala, A.O.A., 2002. Concept Mapping Problem-Solving Paradigms and Achievement in Secondary School Mathematics. *An Unpublished M.ed Project, University of Ibadan.*

Awolola, S. A. 2009. Effects of brain-based instructional strategy on students' achievement in mathematics in some selected Local Government Areas in Oyo State. An Unpublished Ph.D. Thesis of the University of Ibadan.

Barnes, M. 1984. Understanding Mathematics Anxiety. *Vinculum*, 21.2:14-19.

Beaslye T,. Mark, L.; Jeffrey, D. and Natali, M. 2001 A Confirmatory Factor Analysis of the Mathematics Anxiety Scale for Children. *Measurement and Evaluation in Counselling and Development*. Mathematics Teacher, 92 (7), 583-586.

Beilock, S. L, & Carr, T. H. (2005). When high-powered people fail: Working memory and "choking under pressure" in math. Psychological Science, 16(2), 101-105.

Boehlert, M. (2005). Self-fulfilling prophecy. In S. W. Lee (Ed.), *Encyclopedia of school psychology*, Thousand Oaks, CA: Sage.

Brophy, J. E. (1985). teacher-student interaction. In J. B. Dusek, V. C. Hall and W. J. Meyer, (Eds.), *Teacher expectancies* (pp. 303-327). Hillsdale, NJ: Lawrence Erlbaum.

Burns, M. (1998). Math: Facing an American phobia Sausalito, CA: Math Solutions Publications.

Cooper, H. M. (2000). Pygmalion grows up. In P., K.Smith, & A.D. Pellegrini *Psychology of Education: major themes* (pp. 338-364). London: Routledgefalmer.

Covington, M. V. (1992). *Making the grade: a self-worth perspective on motivation and school reform*, Cambridge University Press: Cambridge.

Darling-Hammond, L. (1999). Teacher quality and student achievement: A review of state policy evidence. Seattle: Center for the Study of Teaching and Policy.

Federal Republic of Nigeria, (2004). National Policy on Education (4th Edition). Abuja. NERDC Press.

Fuller, E.J., & Alexander, C. (2004). Does teacher certification matter? Teacher certification and middle school mathematics achievement in Texas. Paper presented at the national meeting of the American Education Research Association, San Diego.

Good, T. L. (1979). Teacher effectiveness in the elementary school. Journal of Teacher Education, 30, 52-63.

Good, T. L., & Brophy, J. E. (1994). *Looking in classrooms* (6th edition). Harper & Row: New York.

Harper, N. W, & Daane, C. J. (1998). Causes and reduction of math anxiety in pre-service elementary teachers. Action in Teacher Education, 19(4), 29-38.

Hopko, D.R. 2003. *Journal of Educational and Psychological Measurement Volume*, 63.2:336-351. *http.//www.designshore.conm/Research/brain-based learning.98htm*

Ifamuyiwa, A.S. 2005. Effects of Self and Cooperative Instructional Strategies on Senior Secondary School Students' Learning Outcomes in Mathematics. *An Unpublished Ph.D. Thesis, University of Ibadan.*

Jackson, C.D. & Leffingwell R.J. (1999). The role of instructors in creating math anxiety in students from kindergarten through college. Mathematics Teacher, 92 (7), 583-586.

Kogelman, S., Nigro, E., & Warren, J. (1978). Mind over math: Overcoming math anxiety at the Dalton School. Independent School, 44-46.

Kyriacou, C. (1997). *Effective teaching in schools: theory and practice* (2nd edition). Cheltenham, UK: Nelson Thornes Ltd.

Laczko-Kerr, I., & Berliner, D.C. (2002, September 6). The effectiveness of "Teach for America" and other under-certified teachers on student academic achievement: A case of harmful public policy. Education Policy Analysis Archives, 10(37).

Levin, J., & Nolan, J. F., (1996). *Principles of Classroom behaviour: A Professional Decision-Making Model* (2nd edition). USA: Allyn and Bacon.

Manson, M. J. (1981). The purpose of Teacher Education in Developing Liberia. WAJE, xv, 3.

Newstead, K. 1998. Aspects of Children's Mathematics Anxiety. *Educational Studies in Mathematics*. 36.1:53-57.

Ojo, O.J. 2003. Relative Effect of Self-Regulatory and Cooperative Learning Strategies on Learning Outcomes in Senior Secondary School Mathematics. *An Unpublished Ph.D Thesis. University of Ibadan.*

Okebukola, O.A. 1986. The Problem of Large Classes in Science. An Experimental in Co-operative Learning. *European Journal of Science Education*, 8.1:73-77.

Onabanjo, C.F. 2004. A Survey of Some Behavioural and Attitudinal Factors Affecting Senior Secondary School Female Students' Mathematical Ability and Achievement. *An Unpublished Ph.D. Thesis, University of Ibadan.*

Osokoya, M.M. (2005): Science Education and National Development in Nigeria: Trends and Issues. *African Journal of Historical Sciences in Education Volume. 1 No. 2*

Rosenthal, R., & Jacobson, L. (2000). Teacher expectations for the disadvantaged. In P., K.Smith, and A.D. Pellegrini (Eds.), *Psychology of Education: major themes* (pp. 286-291). Routledgefalmer: London.

Ruffell, M., Mason, J., & Allen, B. (1998). Studying attitude to mathematics. Educational Studies in Mathematics, 35(1), 1-18.

Shobe, A, Brewin, A, & Carmack, S. (2005). A simple exercise for reducing test anxiety and improving performance on difficult math tests. Journal of Worry and Affective Experience, 1(1), 34-52.

Williams, W.V. 1988. Answers to Questions About Mathematics Anxiety. *School Science and Mathematics*. 88.2:95-104

Zimmerman, B. J. (1999).The relationship between teacher classroom behavior and student school anxiety levels. *Psychology in the School.7, 1 (89-93)*

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