

A Survey of Factors Responsible for Poor Performance by Students in Mathematics on The Junior Secondary School Certificate Examination (JSCE). (A Case Study of Darazo Local Government Area of Bauchi State, Nigeria)

ISAH ABDULLAHI¹, HASHIMU IDRIS², MOHAMMED SANI ISAH³, MUHAMMAD DAHIRU⁴,
YUSUF LAWAN⁵, AISHATU ABDURRAHMAN SABO⁶

^{1, 2, 3, 4, 5, 6} Department of Mathematics, College of Education, Darazo, Darazo Local Government Bauchi State Nigeria.

Abstract- *Mathematics is closely related to everyone's daily life and lifelong planning. Exclude mathematics from everyday life and civilization grinds to a halt. Against this background, research seeks to build and evoke in students and teachers the appropriate appreciation and interest in the value of mathematics for individuals and society. This is done with a particular focus on the junior secondary schools in the Darazo Local government area in the state of Bauchi, Nigeria. The relevant data and information were collected through a teacher questionnaire. It is based on the responses on the 4-point Likert scale. A simple mean was used to analyze the data. The options were assigned the numeric values 4, 3, 2, and 1, respectively. The mean for acceptance is $X > 2.5$, otherwise rejection. For each cluster, the acceptance point is 12.5. The result of this survey confirmed the fact that; The teacher factor, student attitude and commitment, methods of teaching mathematics, use of teaching materials, and school environment are highly valid factors influencing students' poor performance in mathematics on the high school mathematics examination.*

Indexed Terms- *Performance, students, mathematics, secondary school*

I. INTRODUCTION

Education is an ongoing process that society institutes to help its members understand the legacy of the past

and participate productively in the future. It is the bringing out of individuals' innate powers and potentials into society and the acquisition of abilities, skills and competences necessary for self-realization and coping with life's problems. Education is also considered as a tool for integrating individuals into society to achieve self-realization, develop national consciousness, promote unity and strive for social, economic, political, scientific, cultural and technological progress. Education in science and mathematics is therefore becoming a foundation and indispensable tools for scientific, technological and economic advancement in every nation. It gives the nation the ability to use technology for the exploitation of nature's resources. Such exploitation will depend heavily on mathematics to lay the foundation for political, governmental, military, civil, scientific, technological progress, economic development, socio-cultural and ecological peace. There are a number of questions that need to be answered at this stage. What is mathematics? Why should everyone learn mathematics? What is the importance of this subject in life and in school lessons? What is the benefit of putting so much effort, time, and money into math classes? The importance of mathematics goes beyond definition, and a country's prosperity depends on the amount and quality of mathematics offered in its school system. Obe (1996) conceptualizes mathematics as the master and servant of most disciplines and thus as the source of enlightenment and understanding of the universe. He goes on to say that without them, understanding national problems would be superficial. Adibele (1997) agree that mathematics

helps the individual to understand the environment and to accurately describe the physical phenomena around each person. Adibele (2007) argues that no other discipline represents such a strong binding force between different branches of science as mathematics, and without it scientific knowledge often remains superficial. Enuokoha et.al (1987) emphasized the importance of the issue to society, noting that mathematics now plays an important role in the United States: in the construction of freeways, the search for energy, the design of television sets, the profitable operation of most Business, astronauts flying spacecraft, studying epidemics, navigating ships at sea all depend on the study of mathematics. Fajamjemidagbo(1996) argues that science has been accepted worldwide as a vehicle for technological, social and economic development. Mathematics is not only the basis for this, but the language of science. In another related study, Igbokwe (2003) highlights the intricate connection of mathematics with science and technology, claiming that without mathematics there will be no science, and without science there will be no technology, and without technology there will be no modern society. For these reasons and many more, the Nigerian government believes that the issue should be taken seriously in our school system; and Nigeria, on their path to technological development, made mathematics not a compulsory subject in the primary and secondary school curriculum of their education systems (Federal Republic of Nigeria, 2004), but also made it a prerequisite for studying science courses in their colleges, colleges and universities (JAMB Brochure, 1992-2007). Felttler (1999) defines mathematics as the study of qualitative relationships; Put simply, it is the science of structure, order, numbers, space, and relationships through counting, measuring, and describing shapes and objects. It is a science in itself, but is often seen as the language and link between all sciences. The general teaching method consists of a series of recurring teacher behaviors; occur uniformly and systematically. This creates the template for a personable, knowledgeable, competent, mathematically gifted and inspiring teaching and learning. It is wrong to name a single method as the best method. A good mathematics teacher will digest or assimilate all available methods in such a way that he/she develops a method that encompasses the good point of all methods. He will not allow any method to become his/her master, but

will remain a true master of all. One of the consequences of the over-reliance on foreign approaches to mathematics education is the apparent lack of fundamental mathematical principles, leading to memorization and underachievement in mathematics, as seen in Nigeria today. Attempts to address this problem have required that teachers should develop strategies that ensure active learner participation, practice-oriented, project-oriented and applicable (Isola, 1997; D'Ambrosio, 2001; Kurumeh, 2004; Isangedigh,1998). This seems to call for the option of giving ethno-mathematics a try; It is a teaching approach that focuses on the students' background, integrating their immediate environment with Eurocentric mathematics in a practical way as required by the concept of place. Ethno mathematics is the study of mathematics that takes into account the culture in which the mathematics arises (Kurumeh, 2004). Ethno mathematics is the cultural utility of mathematics as a science (Murnane, 1981). For D'Ambrosio (2001) it is a teaching and learning of mathematics that builds on the previous knowledge, the background, the content and methodological role of his environment and his past and present experiences with his immediate environment.

However, despite the aforementioned roles play mathematics in our daily life, poor academic performance among Nigeria secondary schools students have being recorded by external examination bodies. Attempts to find a solution to this incessant failure have prompted researchers in mathematics education to consider a number of factors. One of these factors, which is examined in depth in this study, is inadequate teaching method. According to Maduabum (2009), poor mathematics performance is caused by teachers' failure to use appropriate teaching methods and lack of proper teaching aids. The researchers in this study quite agree with the observation made in some quarters that the instructional materials and the method of teaching mathematics in Nigeria is totally out of phase with the background and local environment of the learners.

Teaching materials have been defined by different authors. For example, Osokoya (2009) referred to them as objects or devices that help the teacher make a lesson much clearer for the learner. Instructional materials are also described as tangible or physical

objects that provide sound, image, or both, to the sense organs during instruction (Odiligio 2006). Teaching materials come in different grades, such as audio or audio, visual or audiovisual. Therefore, audio teaching materials refer to hearing-only devices such as radio, tape recorders, and television. Visual teaching materials, on the other hand, are devices that only appeal to the sense of sight, such as E.g. blackboard, diagram, slide and filmstrip. An audiovisual educational material, on the other hand, is a combination of devices that appeal to both the auditory and visual senses, such as television, film and computers. Several studies of teaching materials and school performance have been conducted. For example, (Okoye, 2007; Riylan, 2005 and Saidu, 1995) conducted studies on the effects of teaching materials on student performance in West African Certificate Examinations (WASSCE). Their results show that schools with adequate teaching materials do better than those with inadequate teaching materials. Korau (2006) emphasized that a professionally qualified mathematics teacher, no matter how well trained, would not be able to put his or her ideas into practice if the school environment did not have the equipment and materials needed for him or her are required to turn his competence into reality. Sometimes imported advanced materials and equipment turn out to be expensive and irrelevant; hence the need to produce materials locally. Researchers such as Koleoshe (1998) and Lassa (1987) reported that there were insufficient resources for teaching mathematics in secondary schools in Nigeria. They further stated that the ones available are usually not in good condition. So there is a need for improvisation. However, Lawis (1967) and Marbacrd (2000) noted that improvisation requires adventure, creativity, curiosity and perseverance on the part of the teacher, such skills are only achievable through a well-planned improvisation training program. Consequently, researchers such as Mungola (1967) and Ojo (1986) agreed that whichever method or strategy is chosen to be effective, appropriate teaching materials must be used to facilitate learning.

The physical environment of the school influences students' academic performance. For example, Bloom (1978) confirmed that environmental influences help in the acquisition of knowledge and skills. Ezewu (1983) agreed with the above, stating that educators are interested in the child's environment because of the

effects of the environment on the child, since that, and not heredity, is the phenomenon they can easily control to teach to improve learning and performance. Oke (1982) explained that the physical environment of the classroom, teaching tools to name a few, improves teaching, learning and performance. It is a fact that students' environment affects their performance. For example, the quality of the school building has a direct impact on student performance. Students perform better academically in better buildings Researchers (Carols, 1993; Salau, 1999; Sunpson, 1978; Black, 2001) found that students in old buildings scored 5-7% lower than students in new buildings, and found in independent results that there was an association between the condition of the school building and student performance. School uses various construction and design methods to improve the acoustic environment. This reduces internal noise and external noise factors such as traffic. Another interesting factor is that daylight is a key part of high-performance design. The provision of natural daylight provides biological stimulation that regulates body systems and mood, provides opportunities for natural ventilation, and reduces the need for artificial light, thereby reducing energy costs. Adedipe (2007) concludes that the inadequacy of such physical resources as lecture halls, dormitories, laboratories, libraries and other academic resources leads to poor outcomes because it spreads through overcrowding. Good acoustics are important in any learning situation, but noise in classrooms often causes children to have trouble hearing and concentrating, thwarting the learning process from the start

II. STATEMENT OF THE PROBLEM

The literature has shown that there are factors that are responsible for poor student performance in school mathematics. Observations and reports from the Bauchi State Department of Education showed that a high percentage of secondary school students continue to perform poorly on junior secondary school mathematics certificate examination in the recent years. Despite commendable efforts to develop an acceptable general mathematics curriculum, student performance in this subject seems to have declined over the years. To defuse the situation, this study is an attempt to contribute to these findings as they concern secondary school students. The aim of this study was

to identify the factors responsible for students' poor performance on the junior secondary school mathematics certificate exam.

III. METHODOLOGY

A random sample of 30 mathematics teachers from the total population of 72 from the municipality of Darazo in Bauchi State, consisting of 21 male and 9 female mathematics teachers, completed the questionnaire to determine their response to the factors responsible for poor performance among students in the junior secondary school final examination in mathematics. This corresponds to 41.6% of the mathematics teacher's population in the study area. The simple random method used involved a common drawing method where the numbers 1 to 30 were written on pieces of paper and other papers contained nothing. The 25-item questionnaire was designed to collect

data. Each respondent answered the same 25 questions by ticking the choices given. Choices were designed based on the four-point Likert scale of Agree, Strongly Agree, Disagree, and Strongly Disagree. Content validity was established by relating the content of each question to the literature, while a reliability coefficient of 0.83 was found to be internally consistent. Mathematics experts were given the test tasks for validation in order to meet the disposition of the target group of this study and to make their recommendations. The experts corrected the wording and sentence structure of the questionnaire. These were fully affected at the final correction prior to administration. The test was administered to the respondents by the researchers.

IV. RESULTS AND DISCUSSION

Table 1: The Teacher Factor

S/N	ITEMS	SA	A	DA	SD	MEAN
1	Poor foundation in mathematics is the root of poor performance	18	10	2	-	3.53
2	Students are no longer interested in hard Work	13	10	7	-	3.20
3	I always find it difficult to prepare for a mathematics lesson	6	18	6	-	3.00
4	There are insufficient mathematics teachers in terms of numbers and quality	13	13	5	-	3.23
5	Today, I teach mathematics because there is no alternative job and it is a waiting job	8	15	6	-	3.07

Table 1 shows that the factors listed in the items are responsible for the underperformance of students in mathematics at JSCE in Darazo local government area, Bauchi State. It shows that the teachers' responses to the items in the questionnaire were in the agreed column (2) rather than strongly agreed (1). The

mean response ranges from 3.53 to 3.00. It is important to note that teachers felt that poor foundation, lack of interest, and difficulty in preparation were the root causes of students' poor performance in JSCE mathematics.

Table 2: Student attitudes and engagement with poor performance in JSCE math:

S/N	ITEMS	SA	A	DA	SD	MEAN
1	Students lack interest in mathematics while learning	17	5	5	3	3.20
2	Lack of hard work on the part of students results in poor performance	13	10	7	-	3.20
3	Students should be involved in more practical work than the theoretical	18	10	2	-	3.53
4	Students have psychological fear of	20	5	1	4	3.37

Mathematics						
5	Parents should buy necessary learning materials for their children	13	7	3	7	2.87

The results in Table 2 above indicate that lack of interest, lack of hard work, lack of practicality and poor provision of study materials were the main factors responsible for poor performance in JSCE mathematics. The mean response was between 3.53

and 2.87, well above the acceptance point. Surprisingly, the buck is also passed directly to the parents.

Table 3: Teachers on the school environmental factor responsible for students' poor performance in mathematics on the final exam of Darazo secondary school in Bauchi state.

S/N	ITEMS	SA	A	DA	SD	MEAN
1	Overcrowded classroom and libraries affects negatively performance in mathematics.	23	7	-	-	3.77
2	Learning environment should be conducive for effective teaching and learning to take place.	12	8	5	5	2.90
3	New school building arouses students' interest in learning mathematics	7	3	10	10	2.23
4	I go to school twice in a week because my school is in the village	10	5	9	6	2.63
5	In my opinion the location of school has nothing to do with students' performance in mathematics	19	8	2	1	3.43

The average response in Table 3 shows that teachers accepted the school environment is a supportive factor for both teaching and learning. The mean scores range from 3.77 to 2.23, which meets the criteria for acceptability of a factor. Most teachers strongly agreed

that the learning environment should be conducive to effective teaching and learning. This has a positive effect on the performance of students in mathematics at the JSCE.

Table 4: Teacher opinion on teaching methods as a responsible factor for poor performance of students in mathematics in the secondary school leaving examination.

S/N	ITEMS	SA	A	DA	SD	MEAN
1	I always use varieties of teaching methods when teaching a lesson in mathematics	10	18	1	1	3.23
2	I always like using lecturing method whenever I am teaching a topic in mathematics	12	13	5	-	3.27
3	I always find it difficult adopting a particular teaching method in any mathematical lesson	7	3	10	10	2.23
4	I love demonstration method and I always use it when teaching mathematics	10	16	3	1	3.16
5	Whenever I am teaching mathematics, I do not consider the method I am using because I feel it is not important	1	8	19	2	2.27

Table 4 shows a mean range of 3.27 to 2.27. Out of 30 teachers, 20 agreed that using different teaching methods was beneficial, while 19 out of 30 teachers disagreed when the importance of the teaching method

was questioned, achieving the lowest mean score below the acceptance threshold of 2.50. Consequently, using different teaching methods will improve student performance in JSCE mathematics.

Table 5: Teachers' opinions on the use of teaching materials in mathematics classes as a factor responsible for students' poor performance in mathematics on the secondary school leaving examination in Darazo area of the local government of the state of Bauchi

S/N	ITEMS	SA	A	DA	SD	MEAN
1	There are no functional libraries and mathematics laboratories in my school.	2	19	7	2	2.70
2	I prefer teaching any concept in mathematics without using instructional materials	1	8	19	2	2.27
3	Teachers should use instructional materials to make mathematics real	18	10	12	-	3.53
4	My school principal will prefer buying football and other athletics facilities rather than mathematics teaching aids.	12	13	5	-	3.27
5	I feel teaching aids will not make any impact on students' achievement in mathematics	1	8	19	2	2.27

The result of Table 5 has a mean ranging from 3.53 to 2.27. Most teachers (18), with a mean response of 3.53, strongly agree that teaching materials should be used to make mathematics lessons more realistic. This will go a long way toward making a greater impact on student performance in JSCE math. Teachers who were of the opinion that teaching materials were ineffective or saw no need for the use of teaching materials in mathematics classes fell below the acceptance point with a mean response of 2.27. So, the conclusion here is: The use of educational materials will increase the performance of students in JSCE mathematics in the administrative area.

CONCLUSION AND RECOMMENDATIONS

This present study aimed to investigate the factors responsible for the poor performance of students in mathematics on the final secondary school exam in the municipality of Darazo, Bauchi State. From the results of this survey, it was confirmed that; Teacher factor, student attitudes and engagement, methods of teaching mathematics, use of teaching materials, and school environment are highly valid factors influencing students' poor performance in mathematics in the JSCE. These results would therefore be of great help to governments, teachers, students, professional policy makers and parents to provide a solid stepping stone to launch a new template in the search for a lasting solution to the persistent problems of underachievement in mathematics at the JSCE and of the SSCE in general.

Authorities should provide and retain qualified teachers and provide schools with adequate teaching and learning facilities and equipment. The teacher preparation program should be student-centred. They should show students equal concern and treatment and have the knowledge of classroom interaction that serves to undermine students' self-esteem, academic achievement and ultimately professional preparation so that they are adequately prepared to face the future with hope to look forward to. Teachers should create an environment where students are not afraid to ask questions. Nigerians should be mathematically literate. Concreteness should be carefully applied in mathematics teaching at all levels (primary to tertiary).

• Declaration of the Competing Interest

There is no any conflict of interest for all authors of this manuscript.

REFERENCES

- [1] A. Obe. "Student and Teacher related variables as determinants of secondary school student academic achievements in Chemistry". *Journal Pendelikon*, 32, 3-18. (1996).
- [2] A. Igbokwe "The Influence of Gender, School Location and Socio-Economic Status on Students' Academic Achievement in mathematics" *Journal of Education and Practice* Vol.6, No.17, 2003
- [3] A. E. O., Erukoha, O. I. T, "Curriculum development in Nigeria for colleges and universities. Whyte and Whyte publishers."

- [4] Fajemidagba, O. (1986). Improving Mathematics Teacher Education in Nigerian Universities, a theoretical formulation with implication for research *Journal of research in Curriculum* 4(2), 11-18.
- [5] Fettler, E (1999). The relationship between measures of teacher experience with mathematics educational level and students' achievement in mathematics in the critical importance of well-prepared Teachers U. S Department of Education.
- [6] Isola, O. M. (2010). Effects of Standardized and Improved instructional materials in students' academic achievements in secondary school M.Ed Thesis, University of Ibadan, Ibadan.
- [7] Isangedigh, A. J (1988). Under-achievement: An index of learner-environment mismatch *Nigerian Journal of Educational Psychology* 3(1) 220-226
- [8] Korau, Y. K. (2006). Educational Crises Facing Nigerian Secondary Schools and Possible Solutions being a paper presented at Faculty of Education National Conference 10th - 14th July, 2006
- [9] KoleOsho, A. Oyekanmi, S.O and Olabode, S. A. (1998). A study of the sex differences in achievement of field-dependent and field independent students in mathematics. *Journal of the Science Teachers Association of Nigeria* 33 (122), 62-65
- [10] Lassa, P. N. (1987). Assessing the cognitive outcomes of senior secondary school mathematics students. *Journal of Educational Studies Institute of Education, University of Jos volume 1, Pp. 8-18*
- [11] Lawes, J. S. and Eddy, C. T. (1967). *Understanding Children an Introduction to Psychology for African Teachers*. London: George Allen and Unwin Limited. Page 25
- [12] Marbach-Ad, G. and Sokolove, P. G. (2000). Can undergraduate Biology students learn to ask higher level questions? *Journal of Research in Science Teaching* 37 (8)854-870
- [13] Mughol, A. (1976). *A Study of the Concepts of Physics at the Secondary School Level*. Physics Education 466(16) 145-146
- [14] M.S. C. Kurumeh, "Effects of Ethnomathematics teaching approach on students' achievement and interest in geometry and mensuration. Unpublished PhD Thesis, University of Nigeria, Nsukka" (2004).
- [15] M. K. Abidele "Comparative effects of mastery learning and enhanced mastery learning strategies on students' achievement and self-concept mathematics". PhD thesis, University of Ibadan (1997).
- [16] Murnane, R. J., & Philips, B. (1981). Learning by doing, Vintage and Selection: Three pieces of the puzzle relating teaching experience and teaching performance. *Economic of Education Review*, 1(4), 453-465
- [17] Maduabum, M. A (2009). Science teacher effectiveness and national goal attainment in Nigeria: 11th Inaugural lecture Abia State University, Uturu
- [18] Ojo, J. O. (1986). Improving Mathematics Teaching in our Schools, ABACUS. *Journal Mathematics Association of Nigeria* 17(1) 164-177.
- [19] Okeke, R.A. (1982). Topic Difficulties in Secondary School Physics. Unpublished M.ED. Project University of Ibadan.
- [20] Osokoya, M. M (1999). Some determinants of Secondary school students' academic achievement in Chemistry in Oyo State. *Unpublished PHD thesis*, University of Ibadan, Ibadan.
- [21] Odili, G. O (2006). *Mathematics in Nigeria secondary Schools: A teaching perspectives*. Port Harcourt: Anachuna Educational Books.
- [22] Okoye, N. S (2007). *Theory and practice of curriculum development* Abraka: Delsu investment Limited, Delta State.
- [23] O. Calep "Mathematics in sciences and technology (keynotes Address)". *Annual Conference Proceedings of Mathematical Association of Nigeria*, 27-(2002).
- [24] O. Carlos. "A study of mathematics teacher programme in Nigeria Universities". *Illorin Journal of Education*.6(10), (1993)3-7
- [25] Rivkin, S. G., Hanushek, E. A & Kain, J. F (2005): Teachers, Schools and academic achievement. *Econometrics*, 73, 417-458
- [26] Sidhu, K. S (1995). *The Teaching of Mathematics* New Delhi: Sterling Publishers private Limited.
- [27] Salau, M.O. (1995). Analysis of students' enrolment and performance in mathematics

- senior secondary certificate. *Journal of Studies in Curriculum 5 and 6 (1 and 2)* 8
- [28] Sells, M. O. (1978). *Mathematics a Critical filter*. Science Teachers Association 45 (2) 28-29
- [29] Simpson, R. D. and Wazik, J. (1978). Correlation of Selected Affective Behaviours with Cognitive Performance in biology course of elementary teachers. *Journal of Research in Science Education. January 1978 Issue 1*, 65
- [30] S. Black. (2001). "Building blocks: How schools are designed and constructed affects how students learn". *American School Board Journal* 188 (10),(2001) 44-47. IMPROVING THE TEACHING AND LEARNING OF THE CONCEPT OF BEARING IN SENIOR SECONDARY MATHEMATICS CURRICULUM IMPROVING THE TEACHING AND LEARNING OF THE CONCEPT OF BEARING IN SENIOR SECONDARY MATHEMATICS CURRICULUM
- [31] T. N. Adedipe." The relevance of instructional materials in teaching and learning in Robert-Okah. I & Uzoeshi, K.C. (ed) *Theories are practice of teaching*, Port Harcourt: Harey Publication. (2007).
- [32] U. D'Ambrosio "What is Ethnomathematics and how can it help children in schools?"
- [33] V.T. Beston (ed)," *Teaching children mathematics* National council of teachers of mathematics, NCTM. Davidson (2001).