

Nigerian Students' failure in mathematics: Who is to be blamed?

¹Adebayo, S. Oyefusi, ²Samuel, A. Amusa, ³Adeneye, O.A. Awofala & ⁴Alfred, O. Fatade PhD

^{1&2}Dept of Computer Science/Statistics, D. S. Adegbenro ICT Polytechnics, Itori Ewekoro, Ogun State, Nigeria

³Department of Science and Technology Education, University of Lagos, Akoka, Nigeria

⁴Dept of Mathematics, Tai Solarin University of Education, Ijagun, Ijebu-Ode, Nigeria

E-mails: adebayooyefusi@gmail.com; wale4joy2003@yahoo.com,

aawofala@unilag.edu.ng; awofalaaaoa@yahoo.co.uk, fatadeao@tasued.edu.ng

ABSTRACT

The annual poor performance of students in mathematics in Nigeria as revealed by the West African Examinations Council (WAEC) and the National Examinations Council (NECO) is a major concern to the stakeholders in the education industry. This is because many students are denied admission into the nation's universities to solidify their career aspirations on the account of poor performance in mathematics. Accusing finger has been pointed to the teachers of mathematics as the only major contributor to students' underperformance in mathematics while other contributors such as parents, students and ministry of education have been rarely blamed. In this paper effort is made to espouse the potential players that could possibly influence students' performance in mathematics. Investigation revealed that the ministry of education (government), teachers, parents and students themselves are responsible for the dismal performance of students in mathematics learning in Nigeria. Thus, it is suggested that an ethos of great expectation on the part of the government(s), parents and teachers might influence students' rates of success in mathematics in Nigeria. Conclusively, by boosting provenances to inner, malleable and well-regulated elements, such as effort, rather than ability which is peripheral, static and uncontrollable, stakeholders like parents and teachers can propagate the intellectual seeds for developmental transformation capable of creating higher and fruitful academic success for students of mathematics in the country.

Keywords: Perception, Teachers, Mathematics, Technological Renaissance, Innovations and Productivity

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1. INTRODUCTION

In recent times in Nigeria, there is a growing concern among stakeholders in the education industry over the recurring poor performance of senior secondary school students in public examinations in mathematics. Every year, students in grade 12 enrol for the West African Senior School Certificate Examinations (WASSCE) and the National Examinations Council (NECO) Senior School Certificate Examinations (SSCE) and mathematics being a core cross-cutting subject is offered in these public examinations. The annual deterioration in performance in mathematics shows that students are not proficient in the core curriculum in mathematics. While most of the concern is focused on the poor performance, little attention is given to the contributor(s) of this poor performance.

Keeping this necessary ground apart, one major purpose of this write-up is to examine the underlying dynamics that might possibly cause the poor performance of students in mathematics. The paper is focused on students' performance in mathematics for one major reason. Conventionally, performance of students in other school subjects has always been higher than that of mathematics thereby making poor performance in mathematics a topical issue in Nigeria. From 1991 to 2016, 27.31% of students in Nigeria got credit and above (A1-C6) while 72.69% had pass and below (D7-F9) in the May/June WASSCE in general mathematics (Lawal, 2019). Table 1 below showed the analysis of West African Senior Secondary Certificate Examinations in mathematics results from 2008 to 2017 in Nigeria.

Table1. Analysis of WASSCE in mathematics results from 2008 to 2017 in Nigeria

YEAR	TOTAL SAT FOR EXAM	A1-C6 HIGHER PASSES	% HIGHER PASSES	D7 -F9 POOR PASSES	% POOR PASSES
2008	1,369,142	314,903	23.0	1,054,239	77.0
2009	1,373,009	425,633	31.00	947,376	69.00
2010	1,351,557	453,447	33.55	898,110	66.45
2011	1,540,250	587,630	38.15	952,620	61.85
2012	1,675,224	819,390	48.91	855,834	51.09
2013	1,543,683	555,726	36.00	987,957	64.00
2014	1,692,435	529,732	31.30	1,162,703	68.70
2015	1,593,442	544,638	34.18	1,048,804	65.82
2016	1,544,234	597,310	38.68	946,924	61.32
2017	1,559,162	923,486	59.23	635,676	40.77

Source: West African Examinations Council, Yaba, Lagos

With these worrisome statistics, experts are more inclined to blame the school-majorly the teachers and neglecting the other potential factors like the ministry of education, parents, and the students in the educational process that could influence performance in mathematics. This is a multifaceted occurrence that needs to be examined thoroughly as this poor performance in mathematics may prevent the realization of the Nigerian goals of education.

The goals of the Nigerian educational system as enshrined in the National Policy on Education, section one number 6(a)-(e) pages 1 and 2 include:

- a) Development of the individual into morally sound, patriotic and effective citizen;
- b) Total integration of the individual into the immediate community, the Nigerian society and the world;
- c) Provision of equal access to qualitative educational opportunities for all citizens at all levels of education, within and outside the formal school system;
- d) Inculcation of national consciousness, values and national unity; and
- e) Development of appropriate skills, mental, physical and social abilities and competencies to empower the individual to live in and contribute positively to the society (FME, 2013, p. 1-2).
- f) Since the Constitution of the Federal Republic of Nigeria empowers the Ministry of Education to cater for the education of Nigerians at all levels, it is expedient to examine its place and influence on the performance of students in mathematics.

2. THE MINISTRY OF EDUCATION

The three tiers of government- Federal, State and Local are empowered by the constitution to participate in the management and provision of education for all Nigerians irrespective of sex, age, socio-economic status, tribes and ability. The secondary education is on the concurrent list as stated in the constitution of the Federal Republic of Nigeria meaning that it is within the purview of both the states and the federal authorities. The State Ministries of Education deliver public education for the 36 states while the Federal Capital Territory (FCT) Education Secretariat is responsible for the FCT, Abuja. In Nigeria the curriculum for schools is within the purview of the Nigerian Educational Research and Development Council (NERDC). The NERDC developed the new Senior Secondary School Mathematics Curriculum and forward it to the Ministry of Education in each state of the federation for onward delivery to schools across the nation. The implementation of the new senior secondary school mathematics curriculum started nation-wide in September, 2011. The senior secondary school covers Grades 10 to 12 and its curriculum has four fields of studies namely: Science/Mathematics; Business Studies; Technology; and Humanities in which mathematics is one of the four compulsory cross-cutting core subjects (Awofala, 2017a). The core curriculum for mathematics in the senior secondary school is expected to provide a general education in mathematics for all students at that level. The curriculum consolidates on the work done in junior secondary school and treats them in greater depth. In spite of the goals of Nigerian education, mathematics as a subject in the senior secondary school has its own objectives. The general objectives of senior secondary mathematics teaching that have been identified for Nigeria are:

- (1) To generate interest in mathematics and to provide a solid foundation for everyday living;
- (2) To develop computational skills;
- (3) To foster the desire and ability to be accurate to a degree relevant to the problem at hand;
- (4) To develop precise, logical and abstract thinking;
- (5) To develop ability to recognize problems and to solve them with related mathematical knowledge;
- (6) To provide necessary mathematical background for further education; and
- (7) To stimulate and encourage creativity (Awofala, 2018).

However, WAEC Chief Examiner's report (2016) for mathematics showed that students lacked proficiency in basic mathematics areas such as geometry and trigonometry; three-set problem; longitude and latitudes; probability with replacement; coordinates of points and the midpoint of vectors; and the locus of points equidistant from two intersecting lines. The implication of this report is that large percentage of the students failed to acquire the requisite level of proficiency authorized by the West African Examinations Council and the Ministry of Education in mathematics. The burning question to ask is: have the ministries of education at the states and the federal level accomplished their responsibilities to the senior secondary school students in Nigeria?

The answer is Yes and NO. Yes because the ministries of education are responsible for the appointment and promotion of teachers in schools, provision of school structures and other social amenities, payment of teachers' salary as and when due, and payment of examination fees of senior secondary year three students to WAEC and the National Examinations Council. With these the ministries of education have provided the needed opportunities for students at the senior secondary school level to attain higher academic feat. No because the ministries of education do not frequently engage teachers of mathematics in professional development undertakings, porous supervision of teachers and low quality control mechanism. These shortcomings of the ministries of education show that they cannot attain their goals by working in isolation, but must depend on the prompt involvement of other stakeholders in the education industry, precisely the teachers.

3. THE TEACHERS

Experts in Nigeria have blamed the teachers for students' poor performance in school mathematics on their lack of commitment to their vocation. In public schools in Nigeria, teachers spend little time in checking on students' progress and rarely give them homework because of large class size. Some teachers show up in school without having a clear understanding of what and how to teach. They consider the methodology of teaching as something not to be prearranged and intended. While most teachers complain about their meagre salaries and poor working conditions, only a few see teaching as a calling and are prepared to be passionate about it in their delivery. Teachers of mathematics need to cultivate a strong emotional bond with their students if they are to inspire them to engage in the learning of mathematics. Notwithstanding, the National Policy on Education recognizes that no nation can rise above the quality of its teachers. Generally, it is the belief of the Nigerian populace that excellent teachers are education's superlative assets and human capitals required to turn around the fortune of the nation educationally, politically and economically.

The saying that: "a middling teacher tells, a noble teacher enlightens, a magnificent teacher establishes, and a prodigious teacher motivates" shows the importance of having prodigious teachers teaching in the nation's citadel of learning. Teaching effectiveness is a function of many variables including teachers' content knowledge (Awofala, 2012a) and teachers' content knowledge is sine-qua-non for effective teaching. A teacher that has the mastery of the subject matter coupled with pedagogical intelligence is capable of inspiring the students to learn effectively than a teacher with shallow knowledge of the content and poor pedagogical intelligence. Students' perception of their teacher's mastery of subject matter and pedagogical intelligence may have significant influence on students' academic performance. In Nigeria, typical teaching in secondary schools mathematics classes is characterized by teacher-centred pedagogy (Awofala, Fatade & Ola-Oluwa, 2012; Awofala, Arigbabu & Awofala, 2013) amidst large class size (Ojaleye & Awofala, 2018; Owwoeye & Yara, 2011; Yara, 2010) in which students engage in rote memorization (Ojaleye & Awofala, 2018) leading to poor performance in mathematics (Awofala, 2012b). It is very popular that teachers' adoption of student-centred pedagogies in teaching mathematics produces significant positive outcomes in mathematics.

According to Shulman (1986) teachers' content knowledge can be classified into three namely: (a) subject matter content; (b) pedagogical content; and (c) curricular content. Content knowledge is described as the volume of and the arrangement and internalization of knowledge in the thoughts and mind of the teacher. Pedagogical content knowledge refers to the integration of knowledge of subject matter, knowledge of pedagogy and knowledge of student to enhance teaching and learning. Curricular knowledge refers to having mastery of the kind of programme intended for teaching a particular subject and a topic at a specific level, the type of instructional aid accessible for the programme, and the capability to identify a suitable material to enact the programme without any hitch and efficaciously. The subject matter content consists of the cognitive, the skills, and the affective components. The cognitive component refers to the teaching of facts, concepts, principles, theories, hypothesis and laws to the learners. The skill component refers to teaching the learners with the thinking and manipulative skills. The affective component refers to the realm of values and attitudes that are being utilized or promoted via the learning process. Teachers of mathematics must be pedagogically sound and be proficient in mathematics they are required to teach in order to bring the students to the level of conceptual understanding that will soften procedural fluency, empower strategic competence, venerate adaptive reasoning, and propagate productive disposition needed to engender mathematical proficiency (Awofala, 2017b) and keep track of momentous reforms in mathematics and education (Awofala, Ola-Oluwa & Fatade, 2012).

It is suggested that students will display the highest performance improvements when teachers take mutual accountability for students' failure and victory, reasonably than impugning the students for defeat (Lee & Smith, 1996). Disparities in the provenances ascribed to students' success fluctuate with teachers' experience. Veteran teachers are more inclined to ascribe academic success to fixed, organically orchestrated and irrepressible factors of the student such as talent (Georgiou, 2008) whereas neophyte teachers are more inclined to ascribe students' attainment to teacher influences and students' strength (Georgiou, 2008). The implication of this is that veteran teachers tend to become more pessimistic with regards to their ability to advance students' achievement and this suggests a declining absence of assurance to guaranteeing such a result.

Mathematics teachers in Nigeria are often judged by the performance of their students in both internal and public examinations. Nonetheless, the entire blame regarding the glooming performance of students in these examinations should not be placed at the door steps of the teachers alone. The paucity of qualified teachers in mathematics has promoted the engagement of teachers that are not particularly trained and certified to teach mathematics. Thus, in-service training in mathematics is required to help unqualified and underqualified teachers to measure up to the standard of teaching mathematics effectively to the students. In the developed countries such as UK, USA, and Finland, teachers are required to engage in constant professional development programmes to retain their certification whereas in Nigeria teachers are not mandated to go through any professional development programme. It is only of recent and to be specific in 2019 that the Teachers Registration Council of Nigeria (TRCN) started registering qualified teachers through online examinations to be members of the organization. In fact Nigerian teachers do not engage in collaborative teamwork despite being a robust and cost-effective strategy of professional development. Japanese teachers are famous for employing lesson study- an approach for improving students' learning through collaborative development of lessons- in teaching mathematics in the classroom. No wonder Japanese students attain superlative performance in Trends in Mathematics and Science Study (TIMSS) (Hatori & Adzifome, 2008). Collaboration by teachers is not only a means of influencing students' learning outcomes in the affective, cognitive and psychomotor domains but a way of reducing loneliness and promoting efficiency and feelings of fulfillment among teachers. It is equitable, thus, to say that teachers are a contributing factor to the poor performance of students in mathematics in Nigeria. But the load of the blames should not be put on the heads of the teachers alone because the students are also very important part of the educational process. Thus, we examine the role of the students in their performance in mathematics.

4. THE STUDENTS

Diligent and scrupulous teachers are sometimes frustrated by indolent and slipshod students who see no reason for engaging in learning. In a clear and unambiguous manner, diligent teachers make known the topics of the day and the behavioural objectives to be attained. But students who are not diligent in their studies will make mockery of the hardworking teacher's efforts at ensuring that learning takes place in the classroom. In Nigeria of today, students attend mathematics classes with high level of unpreparedness and pay no attention to teachers during pedagogical discourse. Students who are not learning ready cannot make a headway in mathematics class no matter the level of preparation of the diligent teacher. In secondary schools of today, crime, drug abuse, teenage pregnancy, delinquency and cultism are prevalent, with student spending much of their learning time engaging in naughty and mischievous activities rather than engaging in deep learning that could foster mathematical proficiency. Students' disengagement in learning and underperformance in mathematics are traceable to the shortfalls and pathologies of individuals, families and neighbourhoods (Hursh, 2006), reasonably than any imperfections emanating from the schools system. Students who show deficiency in academic ability will lack potential to engross in mathematics learning and are bound to experience high mathematics anxiety (Awofala & Odogwu, 2017; Awofala & Akinoso, 2017) which may sometimes reduce their working memory performance on mathematical tasks (Ashcraft & Krause, 2007; Awofala & Odogwu, 2017).

Thus, students with low academic potentials will affect a teacher's readiness to help them access better learning opportunities (Oakes, 1985). Talents, capacity to comprehend instruction, and persistence are important factors that reside in students and can determine students' learning and level of engagement in mathematics. Students' previous knowledge in mathematics is regarded as the greatest parameter for measuring impending adeptness in mathematics (Awofala & Awolola, 2011) and is consequent upon a blend of factors connecting to the learner's schooling history and family background (Leder, 1992). For students to be prosperous in the learning of mathematics, they must be admitted into school ready to learn and be provided with the direction and fullness of experience required to attain success in school mathematics and move, with self-assurance, in the face of difficulty. Students must know that a solid foundation in mathematics is necessary for them to excel in future mathematics learning and that they must put up positive attitudes towards mathematics linked with a culture of good study habit and an urge to do homework as and when due.

It is important to note that unruly students are threats to a teacher's control of the classroom and until teachers are safe and take charge of their classrooms, students' underperformance in mathematics will linger on. It is undoubtedly that obedient students who are accountable for their learning (success and failure) achieve better performance in mathematics than unruly students who do not take responsibility for their learning. Thus, while students might view individual effort and ability as essential for success in mathematics learning, the responsibility for promoting that effort and evolving the ability might reside somewhere else. Aside schooling, students spend the remaining time with their parents at home and if parents are not involved in their children's education by providing necessary support, the achievement of students in mathematics will suffer. Thus, we turn to examine the role of the parents in students' performance in mathematics.

5. THE PARENTS

Parental involvement is not only a perennial issue in education (Collie-Patterson, 2008) but a vital part of the educational process. Parental involvement has an influence on students' achievement (Koerner, 1999) and a catalyst to students' academic success (Koerner, 1999). Parents who are involved in their children's education and give moral and psychological supports are capable of making a significant difference in their children's academic achievement. As expected, parents who want their children to succeed in mathematics will go extra mile to cultivate good rapport with teachers of mathematics; enhance teachers' teaching by providing enabling environment at home for their children to engage in meaningful learning of mathematics and do their mathematics assignment; restrict children's exposure to television watching after school hours; and rekindle students' interest in mathematics learning and regenerate their career aspirations in mathematical related professions.

However, parents who are not involved in their children's learning of mathematics should not expect success from their children. This is because parents who give no moral and psychological supports to their children and who care less about their school activities will leave students with feelings of inadequacy which may threaten their learning of mathematics. Many Nigerian parents live below the poverty line and are thus incapacitated in sending their children to quality high paying schools. Parents with low income, low education and large family size struggle to fix their children education and this may have a negative effect on their children education. Students from poverty stricken families are not only forced to live in intimidating environment but that the situations they found themselves make them to encounter distressful cultural and tribal tautness, rather than cultivating a culture of belonging.

It is a common knowledge that parents give different attributes to their children's success in mathematics learning. This is because parents connect their child's accomplishment in mathematics with the child's ability but their child's defeat tends to be ascribed to an absence of effort in mathematics. Arguably, this is a self-protection prejudice which empowers parents to see their child as being worthy in the mathematics class and permits parents to embolden their child to put more effort when they are unsuccessful in mathematics. In light of this, effort is viewed as malleable and manageable and therefore can be amplified, while ability is seen as comparatively inflexible and unwavering (Rytkönen, Aunola, & Nurmi, 2007; Rytkönen, Aunola, & Nurmi, 2005).

6. CONCLUSION

In this write-up, we have shown that players such as the Ministry of Education, teachers, students and parents are important contributors to performance of students in mathematics in Nigeria. The extent to which these four players in students' attainment in mathematics believe they are accountable for learning results is a vital contemplation and element in students' success. This may possibly influence senior secondary school students' comportment and inspiration, and finally their growth of educational expertise, skills and proficiency in mathematics. Absence of intelligibility and or harmony around who these players observe is answerable may undeniably be a conflicting and obfuscating element in students' educational scholarship and attainment in mathematics. While students' massive failure in mathematics cannot be attributed solely to teachers' ineffectiveness in the classroom, students, parents, and the ministry of education (i.e the government) contributed in no small measure to this low performance.

All hands must be on deck to promote students' understanding of mathematics at the secondary school level. Primary school children must be prepared academically, socially, and psychologically to fit into secondary schools as poor quality entrants into secondary schools may affect the success expected in the secondary schools. Cooperatively, all the dramatis personae in the education industry need to do more by challenging and arousing students' interest and engagement in the learning of mathematics. Negative attitudes of students towards mathematics should be promptly addressed in the classroom and the teachers of mathematics should display robust mastery of the subject matter and equitable learner-centred pedagogy capable of positively transforming the minds and thoughts of the learners in the education process. An ethos of great hope and expectations displayed by parents, government, teachers and students may create the needed aura for success and fulfillment in students' learning and achievement in mathematics. Conclusively, by boosting provenances to inner, malleable and well-regulated elements, such as effort, rather than ability which is external, fixed and uncontrollable, stakeholders like parents and teachers can propagate the intellectual seeds for developmental transformation capable of creating higher and fruitful academic success for students of mathematics in the country.



7. RECOMMENDATIONS

The following recommendations are made:

- Teachers of mathematics should endeavour to adopt learner-centred pedagogies in the teaching of mathematics.
- Teachers of mathematics should always go for professional development programmes to update their knowledge and mastery of secondary school mathematics.
- Parents should provide the enabling environment at home for their children to succeed in mathematics learning.
- Government at all levels should provide the needed infrastructure to schools to make the teaching and learning of mathematics real and practical.
- Students of mathematics should always put up I can do spirit in the learning of mathematics.
- Students should be dissuaded from putting up negative attitudes towards the learning of mathematics.

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