Revitalizing Mathematics Education in Nigeria: A Caution for Sustainability

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Abstract

Failure trend of students in Mathematics examinations portray weak Mathematics Education which indicates unsustainability and form hindrance to development in Nigeria. Students, teachers, parents, and society are in dilemma about the situation which has led to attribution problem that degenerated to questions like who is to be blamed for students' failure in Mathematics, who should take responsibility for Mathematics learning, and who should set goal for students in Mathematics? In answering the questions, a descriptive survey research design was adopted and the result was that students, teachers, parents, and society have their own quota of blame, responsibility, and goal setting roles. The result was discussed, considering students' attribution, teachers' attribution, parents' attribution, and society's attribution and identified the ways forward. It was recommended among others that. The students should take more responsibility for Mathematics learning by increasing their autonomy through the effort of the teacher. The teachers should increase their goal setting roles by training their students on learning strategies such as Students Goal Setting and Students Growth Mindset Setting.

Introduction

Sustainability is a relatively new concept which was acknowledged about twenty centuries ago, and its starting point is how the world looks like today. It considers the implication of economic, social, environmental, political, and cultural factors in a modern society where science and technology prevail, thereby differentiating the present world from the ancient world where Agriculture prevails. However, sustainability is the capacity to endure or survive in the midst of such factors. This is a very important requirement to efficiently manage all kinds of resources as well as showing respect to people of different social status and other living things. Mathematics could help resolve issues in the various sustainability domains.

Mathematics is important to every individual irrespective of culture, religion, tribe, social status, and gender, in a way that it merged along with daily life. Usman (2002) noted that everywhere we go, everything we do or propose to do, either the structure of Mathematics or its applications play a vital role and this is why most countries, races and peoples put emphasis in all aspects of studying,

developing, and applying Mathematics. Generally, Niss (as cited in Azuka, 2015) identified the fundamental reasons for teaching school Mathematics which include: contributing to the technological and socio – economic development of a society; contributing to its political ideology, cultural maintenance and development; and providing individuals with prerequisites which may help them to cope with life in the various spheres of education or occupation, private life, social life, life as a citizen. The teaching of Mathematics in schools should not be purposely to calculate a high mathematics course, but to develop in the individuals the ability to explain reality, predict reality, and make decisions about the reality of the time to proffer solutions to problems that arise in the day-to-day living.

Mathematics Education is the practice of teaching and learning Mathematics which over the past twenty centuries was part of the core curriculum in all developed countries. Ukeje (2002) asserted that no society can develop without effective teaching and learning in schools. Considering Mathematics in life perspective, Petocz and Reid (2003) reported that students view Mathematics as an approach to life and a way of thinking. They believe that reality can be represented in mathematical terms and their way of thinking about reality is mediated by Mathematics. They make a strong personal connection between Mathematics and their own lives. This implies that sustainability need to be integrated, even into the teaching of Mathematics to encourage students make personal commitment to the area represented by the Mathematics contents. The commitment in this context is a key to ensure actualization of the general objectives of teaching Mathematics in Nigerian schools as a core curriculum subject. The responsibility for Mathematics learning and not just learning but keeping it going, have to be impacted on students, teachers, parents, and society.

Therefore, a weak Mathematics Education in a country is an indication of unsustainability which impedes development. Development is widely conceived as a participatory process of social change in the society, intended to bring both social and material advancement; including greater equality, freedom and other valued qualities, for the majority of people through their gaining control over the environment (Ambali, 2012). Some of the elements of development include high standard of living, high Agricultural productivity, high technological productivity, adequate exploration and exploitation of the natural and mineral resources of the society, less dependence on imported materials, presence of heavy industries, high literacy and numeracy rate of the citizens, appropriate health care delivery and low unemployment (Azuka, 2015). Emphatically, "Sustainable national development cannot be possible if Mathematics is set aside and for Mathematics to be more relevant to individuals as well as the nation for its sustainability, there must be effective Mathematics instruction in schools" (Lucky & Hauwa, 2016: 204). There are researches which reported that the teaching and learning of

Mathematics in Nigerian schools is not yet satisfactory which could be evidenced in the result released yearly by West African Examination Council (WAEC). Thus, there is need to revitalize Mathematics Education in Nigeria to caution sustainability.

Statement of the Problem

Actualization of the general objectives of teaching Mathematics in Nigerian schools as a core curriculum subject is not effective because students, teachers, parents, and society are in dilemma of the failure trend of students in Mathematics examinations which portray a weak Mathematics Education. This has led to attribution problem of which the following rationales are to be addressed, as a way of revitalizing Mathematics Education in Nigeria to caution sustainability.

Who is to be blamed for students' failure in Mathematics?
Who should take responsibility for Mathematics learning?
Who should set expectation or goal for students in Mathematics?

The participactory factors in Mathematics education are the students, the teachers, the parents, and the society. However, the specific objective in this context is to find out the extent to which the participatory factors in Mathematics education are to be blamed in order to foster expectation increment, take responsibility in order to encourage commitment, set goal for students in order to ginger up persistent effort and focus.

Research Questions

Based on the specific objective, the following questions are answered:

To what extent should the students, the teachers, the parents, and the society be blamed   for students failure in Mathematics?
To what extent should the students, the teachers, the parents, and the society take responsibility for students' learning in Mathematics?
To what extent should the students, the teachers, the parents, and the society set expectation or goal for students in Mathematics?

Methodology

Descriptive survey research design was adopted to seek information from a number of Nigerians randomly selected from the public to respond to the questionnaire used for this research. The questionaire comprised of closed ended items about blame, responsibility, and goal seting roles with four options. The

design helped to describe the perceived level of blame, responsibility, and goal setting roles, having various individuals completed the questionnaire. It enabled this paper identified the weakness of the participatory factors in Mathematics education for revitalizing.

Result

The data collected from the survey are expressed in simple percentage according to the research questions. The result is summarized in the bar charts as follows:
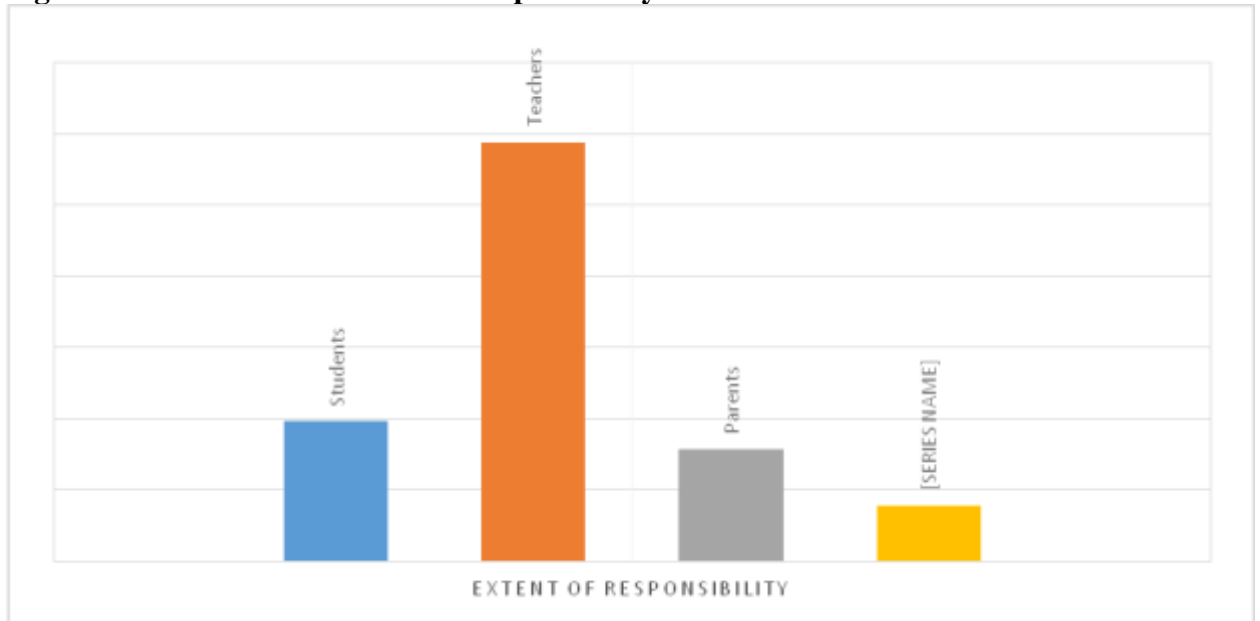
Research Question One: *To what extent should the students, the teachers, the parents, and the society be blamed for students failure in Mathematics?*

Figure 1: Bar Chart on Extent of Blame
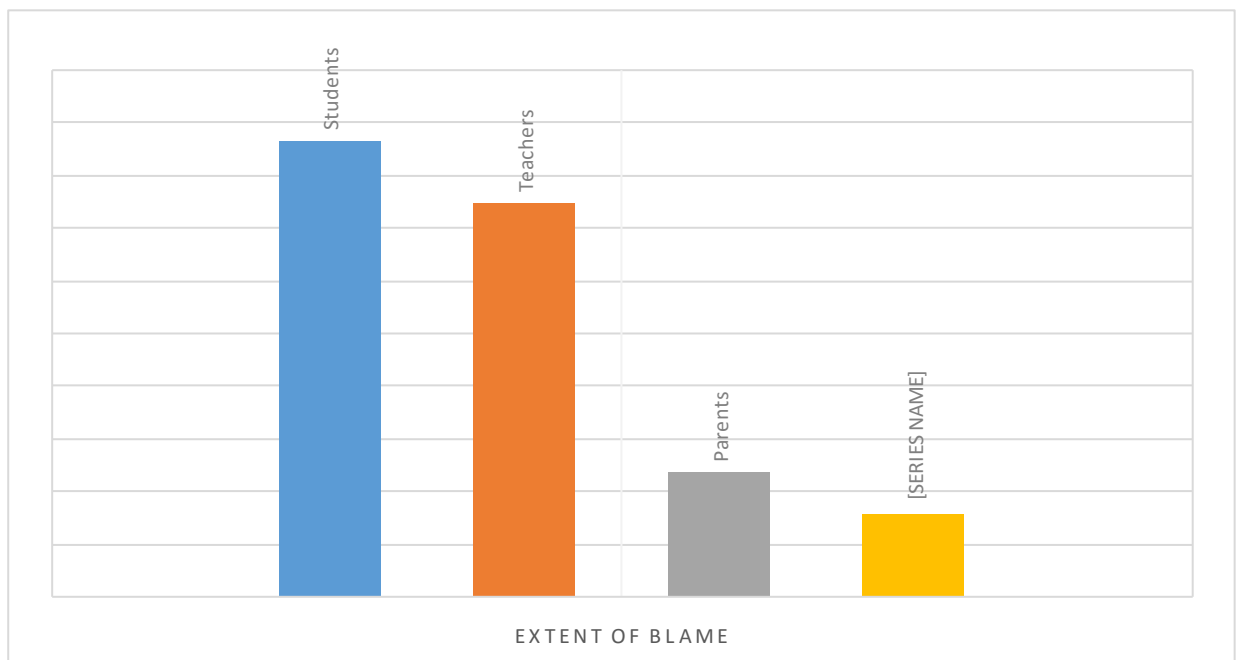
Research Question Two: *To what extent should the students, the teachers, the parents, and the society take responsibility for students' learning in Mathematics?*

Figure 2: Bar Chart on Extent of Responsibility

Research Question Three: *To what extent should the students, the teachers, the parents, and the society set expectation or goal for students in Mathematics?*

Figure 3: Bar Chart on Extent of Goal Setting Roles
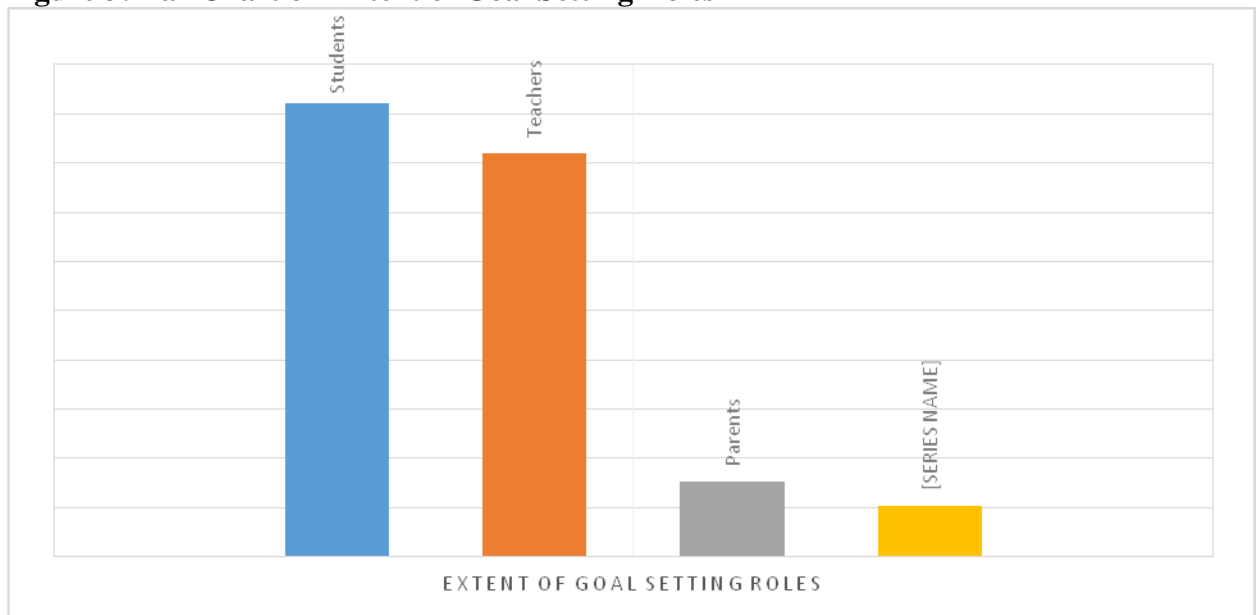
Discussion and Conclusion

The result obtained from the survey indicated that the students, the teachers, the parents, and the society have their own factors weakening Mathematics Education in Nigeria, but it is paramount to consider how they snick away from blame, responsibility, and goal setting roles through attribution and identify the way forward. It is a basic assumption of Weiner (2005) model of attribution that students are affected by both environmental factors such as the characteristics of the home or school, and by personal factors such as previous experience and prior knowledge.

Students' Attribution: Students have 43.14% of blame, 19.61% of responsibility, and 46.15% of Goal setting roles to play. When students are asked why they fail Mathematics, the possible responses are poor teaching, lack of ability, and lack of effort. Poor teaching means that the blame is to teachers and the school as a society of its own within the larger society. Lack of ability means that the blame is to Mathematics itself due to its involvement in abstract reasoning, but this is a belief problem that teachers can change through Students' Growth Mindset Setting (SGMS) recommended by Dweck (2008a).

Lack of effort implies that the blame is to the students, the teachers, and the parents. Students are not committed, persistent and resilient in their effort towards the goal to make them have autonomy. Benson (2001) defined autonomy as the ability to take responsibility for one's learning. Autonomy is not innate but develops through learners training; that is, learners need to be taught learning strategies and how to use them (Benson, 2001). A number of studies indicated that goal setting affects performance and enhance achievement (Moriarity, Pavelonis, Pellouchoud, & Wilson, 2001; Boekaert, 2002). Pennycook (as cited in Moeller, Theiler, & Wu, 2012) established that autonomy is a long – term aim of education and in support of this notion, Mento, Steel, and Karren (as cited in Moeller, Theiler, & Wu, 2012) pointed out that participatory goal theory states that students who choose their own goals perform at higher levels in education than students who have goals set for them. Thus, it is important to consider Students' Goal Setting (SGS) processes or activities by which teachers might openly guide their students toward increased autonomy. It is the effort of teachers that will challenge the students under the auspices of their parents who are as well like the teachers after the school hours. A number of studies indicated that goal setting affects performance and enhance achievement (Moriarity, Pavelonis, Pellouchoud, & Wilson, 2001; Boekaert, 2002). These studies and many others have shown that appropriate goal setting, along with timely and specific feedback, can lead to higher achievement, better performance, a high level of self – efficacy, and self – regulation.

Teachers' Attribution: Teachers have 37.25% of blame, 58.82% of responsibility, and 41.03% of Goal setting roles to play. Teachers seek to explain unexpected performance of their students by examining students' previous knowledge and difficulty of the task assigned. It means that they blame factors that have psychological implications such as locus (whether the cause emanates within the students or the environment), stability (whether the cause is stable or unstable), and controllability (whether the cause is under the control of the students) (Margaret & Alfredo, 2000). Controllability is linked to responsibility which implies that a controllable cause of failure gives rise to the perception of teachers that students are responsible for their failure in Mathematics. These factors could lead teachers into negative behaviors such as punishing students, giving help to students during examination (examination malpractice) even when engaged in easy tasks, and blame Graham (as cited in Graham and Williams, 2009). Graham and Williams (2009) explained the empirical fact that teachers' attribution of failure by students to lack of effort make students feel responsible, anger is elicited, and punishment or reprimand is meted out.

In contrast, when failure is attributed to lack of ability, the student is perceived as not responsible, sympathy is aroused and examination malpractice may be involved to help the students succeed. This is the situation in most schools and in a way, teachers and school as part of the society use it to exonerate themselves from blame, but it can be changed. However, attribution to lack of effort is an unstable (temporary) factor which indicates growth mindset and causes expectation that failure need not occur again, which will prompt the students to learn harder and persist. This will help teachers provide sufficient opportunities for students, adopting scaffolding techniques suggested by Bruner's theory (Lucky & Hauwa, 2016).

Parents' Attribution: Parents have 11.76% of blame, 15.69% of responsibility, and 7.69% of Goal setting roles to play. Long ago, researches have revealed that parents' Mathematics related perception and attribution varied with their children's level of Mathematics ability and gender (eg. Olatonde, 2009, Al-Qaisi, 2010, Soni & Kumari, 2015, etc). They credited daughters with more effort than sons, and sons with more talent than daughters for successful Mathematics performance. These attributional patterns predicted sex – linked variations in parents rating of their children's effort and talent (innate ability). These parental factors lead students to develop self – concept of Mathematics ability, future expectancies, and subsequent failure.

Most times, it lead to stereotype threat on the part of female students. It is parents' responsibility to monitor their children at home and ensure that students persist in their effort to actualize learning goal on daily basis. It is the students'

responsibility to learn, but the goal setting roles of parents is to enforce commitment to learning goal. High goals lead to greater effort than low goals (Locke & Latham, 2002) which prompts the need for parents to enforce commitment.

Society's Attribution: Society have 7.84% of blame, 7.84% of responsibility, and 5.13% of Goal setting roles to play. School, including teachers' training institution is a microcosm of the society and it sees students' failure in Mathematics as an evidence of ineffective teaching. This is why school adhere strictly to evaluation of students to identify weaknesses. The society has lesser blame, lesser responsibility, and lesser goal setting roles which implies that it has almost taken care of lapses against unsustainability, but it could be deduced that the society should refurbish the system of training and recruitment of teachers as they have more responsibility, avoid recruitment of unqualified and unprofessional teachers. Students are at the center of learning and they have more blame, and more goal setting roles, but all transcend to teachers, being why they have more responsibility. Teachers are to provide learning strategies such as Students' Goal Setting (SGS) and Students' Growth Mindset Setting (SGMS) to help students eliminate blame, set their expectation, and develop more autonomy.

Recommendations

The following recommendations are tendered, which if imbibed by the participatory factors in Mathematics Education in Nigeria will help to augment the present level of attainment and ensure continuous survival in the midst of economic, social, environmental, political, and cultural factors in the society where science and technology prevail.

The students should take more responsibility for Mathematics learning by increasing their autonomy through the effort of the teacher.
The teachers should increase their goal setting roles by training their students on learning strategies such as Students Goal Setting and Students Growth Mindset Setting.
The parents should increase their goal setting roles by enforcing students commitment to set goal.

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