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(M.A.N)**

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## STRATEGIES FOR ATTAINING QUALITY MATHEMATICS EDUCATION FOR SUSTAINABLE DEVELOPMENT IN NIGERIA: POSSIBLE WAY FORWARD IN THE 21ST CENTURY

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### ABSTRACT

Quality Mathematics Education for sustainable development in Nigeria is indeed imperative in this era of 21st century. The reason is obvious in recent times from reports that mere acquisition of mathematics literacy and competencies is inadequate. This is because the reports continue to show students' / pupils' distaste for the subject. Precisely, UNESCO (2012) reported that, mathematics knowledge and competencies fall short of the expected level due to continuous low achievement of students in teachers' and standardized examinations / assessments. That is the reason why, this paper is per-  
scoping Quality Mathematics education in 21st century under the following sub-headings: Quality mathematics education and sustainable development with main paragraphs as, the role of quality mathematics education in sustainable development and what the mathematics teachers need to know; Challenges facing mathematics education in 21st century; and the possible way forward in form of suggestions for achieving quality mathematics education for sustainable development. The challenges facing mathematics education in 21st century include: building a professional consensus about the values and accessibility of a challenging mathematics education for everyone, building a professional consensus about teaching and learning mathematics. It was concluded that, the sustainable development which is required for a developing nation like Nigeria needs quality mathematics education. As such, the interplay of Mathematics / Teacher factor relationship resulting to quality teaching and learning of mathematics is a panacea for mathematics education and its sustainability. Recommendations were made that Governments at different levels particularly the Federal has been doing a lot towards the enhancement of Mathematics education. However, there is still need for special focus on quality mathematics education whereby tertiary institutions such as Colleges of Education, Universities' Faculties of Education/National Institute of Education and National Teachers' Institute (NTI) that are concerned with mathematics teachers preparations should put more emphasis on the programme of Teacher Education in conducting and using current researches, particularly action research.

### INTRODUCTION

Mathematics exists as a discipline from the beginning of civilization because it is considered as an excellence integral part of human existence. Therefore, Adegboye (1998) opined that mathematics is being developed as the need of mankind arises, by extension, mathematics increases both in context and application at different times and different cultures. Indeed, competency in mathematics has been recognized at all levels of men's existence as one of the key competencies for personal fulfillments, active citizenship, social inductions and employability in the knowledge society of the 21<sup>st</sup>



### **Challenges Facing Mathematics Education in the 21<sup>st</sup> century:**

Mathematics Education continues to face major challenges as we begin the new millennium.

According to the report from National Council for Teachers of Mathematics (NCTM, 1998) the challenges could be summarized as follows:

- Building a professional consensus about the values and accessibility of a challenging mathematics education for everyone.
- Building a professional consensus about teaching and learning mathematics. By implication, all stakeholders should take the responsibility to bring to an end the shortsighted and harmful bickering in the concept of mathematics education and to begin to breakdown stereotypes and make the importance of mathematics for our nations clear that would enable particularly all teachers to teach better mathematics and teach mathematics better.
- Continuing the reconstruction of mathematics education. This includes our views of mathematics - how to look at and think about mathematics; how we see our roles as educators; our students' roles; our teaching goals and outcomes; developing and interpreting new tools that would let us look beyond right and wrong answers and evaluate problems solving strategies and mathematical thinking. Also, very crucial is training teachers who are committed to the ideals and ready to face the challenges of teaching meaningful mathematics to all students.

Although, research data showed that millions of people have been victims of false assumptions about who has the ability to master mathematics. The teacher is an indispensable factor in school mathematics reform by implication, his/her preparation.

It was reported in HTML (IGI - 19495285) of 2013, that in the past four decades, attention in research on teaching had turned from the content or teaching and learning to the context in why they occur. Many researchers, now viewed learning as active contribution rather than passive absorption and teaching as facilitation rather than transmission.

Teacher Education programme also plays an integral role in familiarizing teachers with current recommendation and realizing those visions. Students' perception of mathematics often times is retrogressive, according to Orton (1992) and other psychologists as cited by Hassan, (2007) that one of the challenges before the mathematics teacher is on how best to inspire the learner to choose to learn mathematics as many learners had the belief that it is a difficult subject and they try to avoid it, because they find it difficult to remember materials exactly as it was taught.

Some of man's challenges include: the need to know what the impacts of his actions are on the environment he depended on, the need to know how the natural world functions. Invariably, he needs to plan for the inevitable changes. All these require enormous and assuming extremely complex and multi-disciplinary questions in the emerging mathematics education for sustainable development. Indeed, quality mathematics requires qualitative insights.

The teacher's difficult task is to mediate between the two worlds. This, the write believes is critical for quality mathematics education. There was a research report confirmed that a movement has emerged which sees mathematics education as a potential means of empowerment for disadvantaged teachers and students; this approach sees mathematics education as a means to better understand and critique the world. This clearly substantiates the fact that change is a process but not an outcome.

### **The Way Forward: Possible Suggestions for Achieving Quality Mathematics Education for Sustainable Development**

That, mathematics teacher has the responsibility to collect enough evidences on how the different individuals in his/ her class can be inspired positively towards learning the subject. This could be done by creating dynamic learning environments which attempt to strike a balance to meet the needs of the curriculum and his/ her deeply held belief.

Hassan (2007) is also of the opinion that the Mathematics Teacher Education of the 21st century should be prepared to make teacher's teaching style dynamics by choosing among the various new suitable methods at his disposal. In particular, the use of ICT, Concept Mapping, Questioning Techniques etc which in cooperate principles of dynamism, Construction perceptual variability. This could be attained in teaching style that permits the learner to handle, observe and experiment with materials and allow him to compare past experiences with new one so as to enable him take new decisions or amend his old precepts and adding new one.

Conney (2002) stated that, the teacher determines the nature of mathematics and mathematics learning because they determine teaching and evaluating the content (mathematics). This is contained in Education Teacher preparation: IG2 – 3403200391 HTML 's report.

The Teacher's degree of preparedness would be determined by strictly adherence to his/her self – inventory which includes the following:

- Self appreciation of mathematics.
  - Clearly envisaging what to accomplish as a teacher in the 21<sup>st</sup> century.
  - Believing, not just thinking that students can learn to reason mathematically.
  - Feeling confident in his/her mathematics ability as a teacher.
  - Be ready for the challenge of teaching everything to everyone.
  - Instilling the ability to 'dream big' in students that is excellence in learning mathematics.
  - Going beyond teaching basic skills and modeling the joy and beauty of mathematics.
  - Having the mathematics abilities developed beyond the level of performing basic procedures
  - Understanding and interpreting for students the mathematical worlds that surround us.
- Also, in the NCTM's report of 1998 (pages.45 & 46) five imperatives or needs were identified for all students, these include:
- becoming mathematical problem solvers.
  - reasoning mathematically
  - communicating mathematical knowledge.
  - reasoning mathematically.
  - learning to value mathematics.
  - becoming confident in one's ability to do mathematics, these in effect should be the cornerstones of new mathematics literacy – what is needed to survive and thrive in the next century.

In a nutshell, meeting these imperatives requires more than hard work and good intentions, but requires belief in our own abilities to teach and belief in our students' abilities to learn, while the teacher's self inventory suggest something's to ponder and talk about as you set your goals for professional development and growth.

### **CONCLUSION AND RECOMMENDATIONS:**

In conclusion, the Nigeria philosophy of Education that portrays education as just about the desire to learn not an obligation should be redefined and restructured. Indeed, the knowledge society of 21st century needs more Mathematics Education than ever before because quality mathematics education is the focus of scientific and technological development which is required for sustainable development of a developing nation like Nigeria. That, mere acquisition of mathematics literacy and competencies is adequate because reports continuous to show students' / pupils' distaste for the subject.

As such, the interplay of Mathematics / Teacher factor relationship resulting to quality teaching and learning of mathematics is a panacea for mathematics education for sustainable development.

Mathematics Education for sustainability is the practice of teaching and learning mathematics resulting to the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

That, quality mathematics education in the 21st century requires curriculum review, teacher's self inventory at preparatory stage and the inculcation of desire basic principles of mathematics education in the students.

Indeed, the challenges facing mathematics education in the 21st century include among others, building a national consensus about values and accessibility to mathematics for every one; building a professional consensus about teaching and learning mathematics and continuing the reconstruction of knowledge of mathematics from the views of all stakeholders- educators, students, teachers, etc

In the light of the above, the following suggestions were proffered that for quality mathematics education for sustainable development to be attained

1. Although Governments at different levels particularly the Federal and State Ministries of Education have been doing a lot in their commitment towards the enhancement of Mathematics education. However, it is imperative at this point that special focus must be on quality mathematics education with more financial commitments in the developmental efforts towards curriculum and instructional programmes; all geared towards to sustainable development.
2. Tertiary institutions such as Colleges of Education, Universities and National Teachers' Institute (NTI) e.t.c. which are consigned with mathematics teachers in the area of research particularly action research; where learning promotes active participation rather than passive assimilation and, teaching that enhances contextual concept presentation rather than meaningless or inadequate inductive acquisition of experiences.

3. The teacher being a powerful force to be reckoned with in any educational system. Mathematics teacher is more important in this era of science and Technology. As such, teachers' self inventory is the spring board towards achieving desired objectives while in preparation to attain quality mathematics education for sustainable development.
4. And, on regular basis, workshops and seminars should be organized by agencies such as NMC, NERDC, NTI and other professional associations such as MAN, STAN. These would avail the participant to current information, skills and new knowledge of presentation and acquisition of knowledge. Hassan (2007) cited Okolo (2003) that, these latest information and associated technologies in the field are powerful approaches to teacher's development in the 21<sup>st</sup> century.

Indeed, quality mathematics education is a panacea for a sustainable development in the 21<sup>st</sup> century. The reasons are numerous, for the simple fact that the teacher, whose role is complex and diverse, requires among others the ability to apply advanced learning theories in teaching and learning with adequate painstaking preparation that would enhance his/ her strengths and reduce weaknesses that invariably impact positively on his/ her effectiveness as teacher.

5. Nigeria as a nation must begin to 'Dream Big' which is a prerequisite for teachers in the 21<sup>st</sup> century to eradicate illiteracy in Nigeria. We need more than basic training to function, at best the knowledge and understanding require for quality mathematics education is the driving force.

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