

# Global Crisis on Nigeria Educational System: An Unprecedented Challenge for Stem Sustainability

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## ABSTRACT

Teaching is an essential career that stimulates Science, Technology, Engineering and Mathematics (STEM) education. STEM education integrates concepts that are usually taught as separate subjects in different classes and emphasizes the application of knowledge to real life situations. This paper seeks to examine the unprecedented challenge for STEM sustainability based on global crisis on Nigeria educational system. The data were sourced from print, online resources and Researchers' personal observation. Inadequate budgetary, poor planning, insecurity as a result of high rate of recent insurgency in the country, inadequate professional teachers, high out of school children were identified as some of the unprecedented challenge facing STEM sustainability in the country. The paper therefore, recommends that educational administrators, government parastatals should consider the desirability to rescue the destructive label of STEM sustainability in Nigeria educational system.

**Keywords:** *Education, Globalization, sustainability, Instruction, Curriculum, Learning*

## INTRODUCTION

From perspectives, it has been observed based on series of indication that a lot of crises has been witnessed and are still emerging in Nigeria educational system at basic and secondary level which were intended to build a solid foundation for the tertiary level but failed to meet up to the standard. There has been slow development in the

country as a result of poor quality of education output. The reason is not farfetched from poorly funded Nigeria educational system which resulted in the great number of drop-out students right from elementary stage that are finding it difficult or uninteresting to proceed to secondary/tertiary stage (Ogunode, Johnson and Olatunde-Ayedun, 2022)<sup>10</sup>. Even for those that strived to be

educated, there has been ugly situation of massive unemployment of graduates in Nigeria.

The World Bank (2017)<sup>16</sup> in Ogunode, Johnson and Olatunde-Ayedun (2022) noted that the quality of basic education, measured in terms of student learning outcomes is low in Nigeria. This was backed up by Aare Afe Babalola, founder of Afe babalola University who stated that it is overwhelming to discover many Nigerian graduates who could not defend their certificates. Education can equip learners with agency and a sense of purpose, and the competencies they need, to shape their own lives and contribute to the lives of others. Education has been one of the worst-hit sectors of the economy since the detection of the first index case of Covid-19 in Nigeria on February 27, 2020. Like many affected countries of the world, the Federal government of Nigeria has taken several necessary precautionary measures to curtail the spread of the disease. This has led to the suspension of all educational activities especially in-class teaching and learning processes.

Unlike the other affected countries, the closure of school in Nigeria did not come with any back-up policy to address the learning disruptions for students (Oyeniran et al., 2020)<sup>15</sup>. Thereby, creating new forms of challenges for teaching and learning processes in the country. Based on the observed education practices during the Covid-19

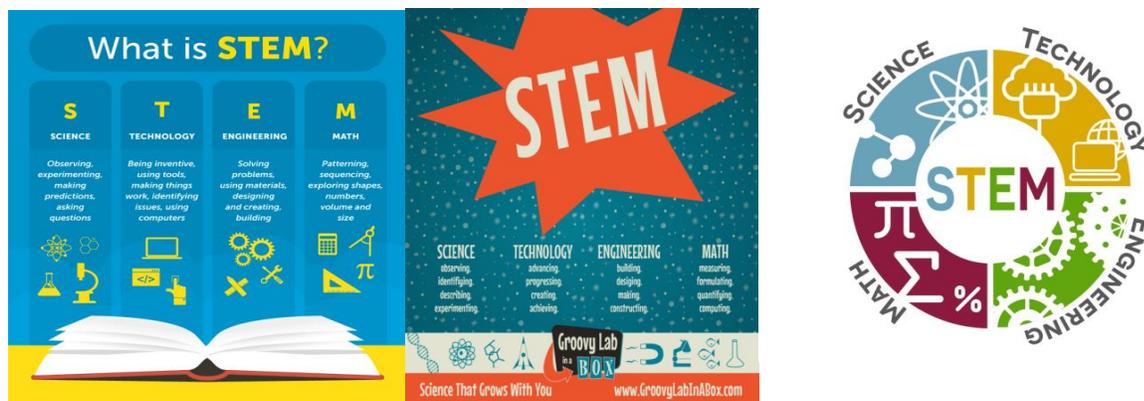
crisis in other countries, the researchers were poised to ask questions like: Are schools prepared for such a sudden change? Do schools have the needed technologies to engage students in remote learning? Do teachers and students have the experiences and resources to prepare, deliver and receive online lessons? Do parents or guardians have the required fund, technology, skills and time to enroll their children in online lessons?

Although, this sudden closure of schools brings about uncomfortable and unprecedented complications and challenges; on the other hand, these measures succeeded in bringing to the spotlight the weakness of the general education system in the country. The Nigeria education system is highly based on traditional classroom education that requires the students to attend school and classes every day

### **STEM IN NIGERIA EDUCATIONAL SYSTEM**

STEM is a form of impacting knowledge to ensure a learner gets practical skills needed to apply in Science, Technology, Engineering, and Mathematics or could simply be define as an education system that seeks to impact students with classroom knowledge and relate that knowledge to real-world situations. Figure 1 below takes us to STEM world

Figure 1: Representing STEM....Thinking Thought



STEM education helps to inculcate lifelong skills in individual so that they can be practical as they seek to solve everyday problems in their surroundings and also, encourages generation of new ideas, which is important in the fast-paced globalization age (Akinniyi, Olaleye & Ogunbanwo, 2017)<sup>1</sup>.

From perspectives, STEM is a different approach to education that linking classroom education to the real world. The system helps improve the chances of all individuals going through the school system to have an important role within society.

This is because of its inclusive approach that allows all individuals to develop the skills necessary for success in various areas of the labor market.

A lesson or unit in a STEM class is typically based around finding a solution to a real-world problem and tends to emphasize project-based learning. Many STEM lessons involve building models and simulating situations. A good STEM lesson ensures

that students understand the connection to the real-world scenarios. Principles of STEM education is that it is: student centered, engages students in collaborative activity, focuses on processes and occurs within the curriculum (it is not extra-curricular) but, project or problem based.

Depending on the STEM subject area; there are academic essentials that guide how classroom instruction is designed and administered to students. Some of these essentials as highlighted in Ntara and Bouchilon (2021)<sup>7</sup> include the followings:

1. Problem based learning
2. Rigorous learning with student engagement, participation and teacher facilitation
3. Personalization of learning and individual support of students which may include advising, flexibility in teaching and career preparation
4. Life skills, work life skills, teamwork, and use of technology

5. Community and belonging – students must treat each other with respect and trust, participate in extracurricular activities, and participate in decision making at school

6. Social and emotional learning

7. Teachers demonstrating what they teach: teachers show their work ethic, ownership of the school, professional development, and the role of school leadership in supporting staff to grow in their careers and impact knowledge

#### **LIMITATION OF STEM IMPACT ON NIGERIA EDUCATIONAL SYSTEM**

The current situation of STEM in Nigeria in relation to the global crisis in nation's educational system forms the premise on which Oriafu (2002)<sup>14</sup> argued that STEM in Nigeria is grossly characterized by inadequacy of content and ineffective methodology by teachers, paucity of facilities, equipment and materials in our laboratories as well as dominated socio-cultural lapses.

The present trend of mass unemployment in Nigeria shows that STEM being taught in schools does not prepare Nigerian graduates to function well in the nation undergoing transition from rural economy to modern economy (Nwachukwu, 2009)<sup>8</sup>. Education is a basic human right and shortest route to individual self-actualization and development (Chinyere & Ejitu, 2017; Aver & Moji,

2021)<sup>3</sup>. The courses which should be taught as hands-on and mind-on practical courses are basically taught theoretically. This makes the students not to benefit maximally from their learning. Also, lack of adequate textbooks, overcrowded classroom/laboratories, poor timetable, lack of cooperation from administrators, presence of external certificate examinations are some of the unprecedented challenges confronting STEM education.

Other challenges include lack of proper monitoring and feedback mechanisms, rapid rate in which teachers are transferred from one school to another, poor policy implementation procedure, shortage of qualified STEM teachers/educators, overwhelming number of activities demanded by the new curricular, non-usage of research reports on the performance of the programmes (evaluation)

#### **UNIQUENESS OF STEM EDUCATION**

Science, technology, engineering and mathematics (STEM) education is uniquely suited to prepare students for success reasons been that: many new jobs are in STEM related fields, there are more students interested in pursuing STEM careers in the U.S. and furthermore, there has been an effort to increase the number of minorities and females in STEM-related subject areas to enhance equality and give equal

opportunity to all people termed as “Gender Balance” (as experienced in City and Guilds London course) hence, STEM jobs are the future of our economy. The activities and projects of STEM education integrate technology to ensure students are prepared for the future. Job that requires STEM background is more likely to provide solid wages. This was reported according to United States Department of Labor that STEM workers earned \$86,980 in 2019.

STEM occupations include computer and mathematical, architecture and engineering, life and physical science occupations, as well as managerial and postsecondary teaching occupations related to these functional areas and sales occupations requiring scientific or technical knowledge at the post-secondary level. Represented in Figure 2 below are STEM related subjects and career job areas.

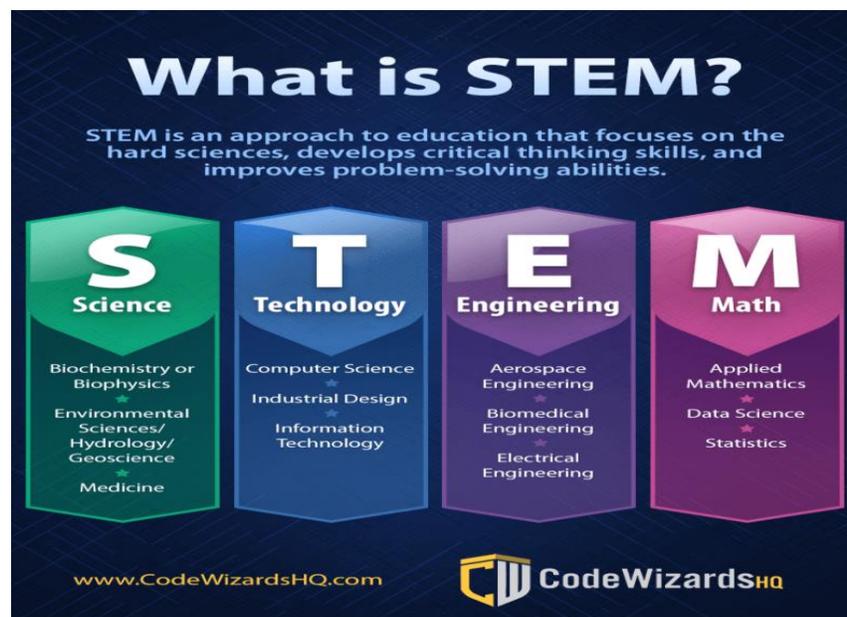


Figure 2: STEM RELATED SUBJECTS AND CAREERS JOB AREAS

Data in table1 below are generated by Occupational Employment and Wages Statistics program, U.S. Bureau of Labor Statistics for Employment projection program.

Table1: The data reveals Employment in STEM occupations, 2021 and projected 2031

(Numbers in thousands)

Occupation category	Employment 2021	Employment 2031	Employment change 2021-31	Percent employment change 2021-31	Median annual wage, 2021-31
Total, all occupations	158,134.7	166,452.1	8,317.4	5.3	\$45,760
STEM occupations	9,880.2	10,944.2	1,064.0	10.8	\$95,420
Non-STEM occupations	148,254.5	155,508.0	7,253.5	4.9	\$40,120

Source: Employment projection program, U.S. Bureau of Labor Statistics, 2022<sup>18</sup>

**TEACHING STEM IN THE AGE OF GLOBAL CRISIS FOR SUSTAINABILITY**

“[Science] is more than a school subject, or the periodic table, or the properties of waves. It is an approach to the world, a critical way to understand and explore and engage with the world, and then have the capacity to change that world...” — President Barack Obama, March 23, 2015. STEM is critical in the world as we know it today because the global economy is dependent on it. It’s more than coding and lab coats. It’s the center of manufacturing, food production, health care, and a lot of what we take for granted, so we can’t live without. People wonder if it’s so important, why we need to go on about it. Why do you need to write about it all of the time? And therein lies the elephant in the room; we haven’t gotten it yet in Nigeria.

The current CEO of Pepsi, Indra Nooyi observed that: “One of the things that my experience has taught me is that if you are trained as a scientist in your youth – through your high school and college – if you stay with the STEM disciplines, you can learn pretty much all of the subjects as you move along in life. And your scientific disciplines play a very important role, and ground you very well as you move into positions of higher and higher authority, whatever the job is. It is a great thing to build our children early because they are innately curious—in an environment where everything is filled with wonder (can you blame them?). They desire discovery and exploration; picking things up, putting things down, asking why; tasting, smelling, and attentively watching anything that wanders in their line of sight. Everything is new,

everything must be analyzed”. Without guidance and enabling inquisitive minds with things to play with and explore, that uninhibited inquisitiveness will either fade or simply won’t reach optimal levels. What’s critical here is the structure that goes along with the activity. Facilitating, helping children draw conclusions, make connections, and discover deeper meanings with the things they’re delving.

STEM is an acronym for science, technology, engineering and mathematics; it is the pivot upon which technological advancement revolves. The place where many spend their time for learning in school—isn’t quite yet where it needs to be in terms of equipping students with STEM skills. Most schools don’t offer coding classes. Incorporating STEM in classrooms is also not cheap unless with guidance by a STEM Education Expert. Also getting qualified or competent staff to drive the curriculum in our schools is tough. It is an important part of a well-rounded education for all students—an education that provides access to science, social studies, literature, the arts, physical education and health, and the opportunity to learn an additional language. It aids students in imbibing a passion for inquiry and discovery and fosters skills such as persistence, teamwork, and the execution of using acquired knowledge to new situations. These growth mindsets and habits that inculcate one’s ability for academic resolve and

lifelong learning in dynamic global marketplace are built from a robust STEM education. This education should start as early as preschool, is culturally inclusive, deploys problem- and inquiry-based approaches, and engrosses students in hands-on activities.

### **LIMITATION OF STEM AND ITS IMPACT ON NIGERIA EDUCATIONAL SYSTEM**

The current state of STEM Education in Nigeria should be a matter of priority and concern to all science teachers and stakeholders. A look at our school systems today shows that something is wrong in many ways. Enrolment into various disciplines of science in our tertiary institutions is highly disproportionate (Akpan, Umoh, 2018)<sup>2</sup>. This may be due to the student dwindling performance in the Senior Secondary Certificate Examination (SSCE).

A close look at the educational practices in Nigeria today reveals that the average science teacher sees the learner as a vessel in which to pour knowledge, thus relegating the potentials for self-directed learning to the background. In this approach, the emphasis is on impartation and regurgitation of facts. This makes students mere on-lookers, learning about science and not learning science (Umoh, Akpan, Udongwo, 2018)<sup>2</sup>. Classroom activities are still characterized by the memorization of factual knowledge with the

teacher as an informer and controller of the learning process<sup>2,13</sup> (Akpan, Umoh, Udongwo, 2018<sup>2</sup>; Olaleye, 2021<sup>13</sup>). Learners are not provided the opportunity to express their understanding of concepts and relate knowledge claims to evidence in a systematic way. This type of learning as observed is one of the major factors opposing effective science teaching and learning in Nigeria.

The explosive enrolment due to the Universal Basic Education (UBE) programme has resulted in overcrowded classes. STEM demands that students should be involved in practical work. Okeke & Chinwe (2017)<sup>11</sup> emphasized that all learning in science must begin and end in the laboratory. The laboratory according to them is a place where students explore problems, generate and test the related hypotheses and ultimately discover newly invented concepts. Due to the over-crowded condition of the classes coupled with the absence of laboratory support staff, teachers in majority of cases carry out practical only two or three weeks to external examinations such as SSCE because they are overburdened with the task of combining their teaching job with that of the laboratory support staff in the face of the large classes. This state of affairs will have a negative effect on overall productivity.

### **Impact of Curriculum designing on Nigeria Educational System to Create New Value**

Curriculum change assumes that education is an ecosystem with many stakeholders. Others are Students, teachers, school leaders, parents, national and local policy makers, academic experts, unions, social and business partners. Furthermore, for changes in curricula and education systems to be relevant in different countries Organization for Economic Co-operation and Development (OECD) Education 2030 has identified five common challenges as follows:

1. Students lack sufficient time to master key disciplinary concepts due to overloaded curriculum. It is time to shift the focus of our students from "more hours for learning" to "quality learning time".
2. Curricula reforms suffer from time lags between recognition, decision making, implementation and impact. The gap between the intent of the curriculum and learning outcome is generally too wide.
3. Content must be of high quality if students are to engage in learning and acquire deeper understanding.
4. Curricula should ensure equity while innovating; all students, not just a select few, must benefit from social, economic and technological changes.
5. Careful planning and alignment is critically important for effective implementation of reforms.

Based on the highlighted above, it then appears that over time concept, content and topic should be designed around students to motivate them and recognize their prior knowledge, skills, attitudes and values. This means that to prepare for 2030, people should be able to think creatively, develop new products and services, new jobs, new processes and methods, new ways of thinking and living, new enterprises, new sectors, new business models and new social models. Increasingly, innovation springs not from individuals thinking and working alone, but through cooperation and collaboration with others to draw on existing knowledge to create new knowledge (Olaleye, 2019<sup>12</sup>, 2013<sup>14</sup>). The constructs that underpin the competency include adaptability, creativity, curiosity and open-mindedness.

## CONCLUSION

The development of education is the foundation for the development of any economy. To provide quality education requires building systems that deliver learning on a daily basis. Also, successful education reforms demand good policy design, strong political commitment and effective implementation capacity. Therefore, Nigeria educational system needs be effectively design to improve the quality and standard of education at home country to world class status to discourage Nigerian students travelling for foreign studies. By

stressing the relevance of STEM to everyone; parents, teachers and our children, logically follows that we understand its importance. It would now be ensured that our children gain the knowledge needed therein and should create occasional interactions with STEM professionals. The fact about STEM is that it is dynamic and doesn't stop. It is an integral part of everything else right now. Recently Tencent a Chinese Tech conglomerate stated that there are 300,000 Artificial Intelligence researchers and practitioners across the globe! Students who are best prepared for the future are change agents. Such students will have a positive impact on their surroundings and effectively influence their future. Future-ready students will need both broad and specialized knowledge.

## RECOMMENDATION

To squarely arrest the ugly situation of massive unemployment of graduates in Nigeria and enhance effective/efficient STEM education capable of producing individuals that are ready to become self-employed persons at the expense of white-collar jobs that are no longer plenty or readily available, the following are therefore recommended:

- 1) A well-planned and implemented STEM policies would play a tremendous role in the development of needed vital skills in individuals;

2) The teacher should be properly trained, provided with adequate knowledge on the subject content with various creative skills, pedagogies and practical approaches of teaching and learning of STEM education;

3) The on-job STEM teachers should acquire reasonable knowledge capable of producing individuals with enough skills and need to be re-trained through in-service workshops, seminars, conferences and study tours;

4) There's need for shift of emphasis from certificate acquisition to the acquisition of practical skills;

5) Government should be ready to invest heavily on STEM education as the corresponding effect would be performance according to expectations;

6) Adequate funding of education such as "Fee Help" are necessary such as it exist in developed countries by various educational stakeholders to reduce the burden cost of education on parents and students;

7) A robust and comprehensive functional educational system needs be design where entrepreneurship skills are rigidly developed for every child to get involves in before certification;

8) Industries should assist in financing institutions in the areas of research and training students in practical methods to acquire

necessary skills needed to function effectively in society after graduation;

9) Teachers needs to be well motivated in terms of salaries and other allowances to produce their maximum productivity and as well measure up to their counterpart in other areas rather than looking for plan B which always distract their wholesome attentions from their teaching profession;

10) Government should constantly use various anti-corrupting agencies to fight against corruption in Nigeria educational system.

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