



Funding Science and Mathematics Education... Tsafe, A. K., Et. al (2025)

Funding Science and Mathematics Education in a Depressed Economy in Nigeria: Issues, Challenges and the Way forward

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Abstract

The paper dwells much on the two intricately interwoven concepts: Mathematics and Science education. Though, different in both their scope and curriculum structure, the paper argues in terms of their relevance to national development in entrenching and developing a sound education system capable of yielding sustainable scientific and technological development. Nigeria's economy in recent years experienced downturn which consequently affect some indices responsible for the smooth growth of Mathematics and Science education as formidable disciplines. The indices, as encapsulated in the paper, include funding, infrastructural deficit, inadequate instructional resources, recruitment of professionally trained teachers, insufficient capacity building programmes, shortage of ICT facilities, insecurity and lack of proper supervision amongst others. In the end, the paper suggests amongst others, the provision of adequate educational indices capable of addressing the widening gap of Mathematics and Science education funding across the country's levels of education.

Keywords: Science, Mathematics, Education, Funding, Economy

Introduction

Science and Mathematics education play significant roles in the development of nations across their strata of human endeavor and spheres of development. Thus, the need for providing effective Science and Mathematics education becomes imperative for developing countries – Nigeria being one of them – to compete favourably with the developed ones in all facets of development. The importance of these two areas was stressed in the Nigerian compendium of education laws – National Policy on Education (Federal Government of Nigeria, 2013) that Mathematics and Science were mentioned immediately after required languages to be used in teaching Nigerian child. This underscored the centrality of the duo in building a nation whose sectors of the economy are expected to be strong, virile and globally competitive. This is because great nations excel on the ground of their achievements in both science and technology (Olson & Riordan, 2012); and this in turn depends on solid foundation of Science and Mathematics education encapsulated and clearly articulated in their curricula (Kaur, 2014; Confrey, Maloney & Corley, 2014). However, in spite this importance of the two areas in building a strong and viable economic sectors, Nigerian economy had suffered a major drawback recently which would have enabled the government to appropriate funds required to drive these two key areas of education to operate optimally. This was against the backdrop of poor budgetary provisions which is below the threshold of 26% set by United Nations Educational, Scientific and Cultural Organization (UNESCO, 2023)



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An Overview of Science Education in Nigeria

Education encompasses all the processes individuals go through in life; from birth to adulthood (Blossfeld & Von Maurice, 2019); in order to develop and optimally utilize their God-given innate potentials through the acquisition of knowledge, skills, abilities and attitudes that are considered instrumental for effective living in society (El-Moslimany, 2018). Education is therefore, a vital aspect of human evolutionary trend and cannot be left to unattended to. That is why nations take time to organize and invest in their education system for maximum benefits of their citizenry (Gleason, 2018). Thus, Nigeria, like other nations recognizes the importance of, and bearing to national development, of education. Hence, the history of education in the country, from its inception as a republic, witnessed attempts by succeeding governments to provide good education for her citizens.

Against the backdrop of this, in 1975, Nigeria declared Universal Compulsory Primary Education (Alikor, 2014; Afolayan, 2014). Secondary education was made tuition free while tertiary institutions enjoyed free tuition and bursary awards concurrently. Determined to use education as a tool for development, Nigeria participated in World Conference on Education held in 1990 in Jomtein, Thailand. The conference ended with a declaration of Education for All [EFA], a global initiative of the United Nations directed at using education as the major instrument for sustainable development. The EFA document came out with guidelines, target areas as well as time frames to encourage nations to see to it that every citizen has access to basic education as a baseline for the eradication of illiteracy. As a consequence, in 1999, the Federal Government of Nigeria (FGN) embarked on Universal Basic Education (UBE) covering primary and junior secondary school levels, i.e. 9-year basic education. The expectation is that a person who is functionally literate and numerate, will be able to meaningfully participate in social, economic and political affairs of his/her country as a responsible citizen. In spite of the seemingly recorded changes in educational policies, our education sector has not been succeeded in transforming our nation from undeveloped or developing to a developed country. Again, Nigeria participated in EFA meeting which subsequently took place in Senegal in 2000 where the international community met, outlined and reaffirmed its commitments to assist African countries' initiatives to achieve EFA. Determined to help developing countries to fast track development process, a set of goals referred to as Millennium Development Goals [MDGs] were introduced, launched and agreed upon by the participating countries; under the auspices of the United Nations.

The understanding is that each nation would study the target areas of which education is one and prepare a blueprint to achieve these ambitious goals. As a consequence, Nigeria came to translate the MDGs document into what is known as the National Economic Empowerment Development Strategy (NEEDS) which has become the driving force behind many reforms that are currently going on in Nigeria today including the ones in education sector. Now, access refers to uninhibited availability of chances/opportunities towards a goal. In the context of education, access to education as pursued by Universal Basic Education Commission means, not only enrolment at no financial cost to learners but also the provision of quality learning experiences, provision of learning materials and a conducive learning environment aimed at equipping learners for self-actualization (Onchari, 2016). This means that when you provide opportunity for a child to enroll in school, you cannot claim that you have given the child access to formal education if you deny them good quality education, deny them of learning materials, of conducive and learner- friendly environment, of qualified and motivated teachers who are equity conscious and integrity-driven. Thus, access to education implies enrolment, quality, participation and equity.



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In Nigeria, education statistics reports increase in enrollment at all levels of education as well as increase in literacy rate; yet the country is still far from being a developed nation for a number of reasons. For one, increase in enrolment and/or possession of literacy and numeracy skills on their own have not proved sufficient to bring about national development because the dichotomy between “developed” and “developing” countries is the level of advancement in science and technology. To this end, rapid and sustainable development of any country can only be achieved through scientific research, rational applications of science and technology knowledge and skills as well as literate workforce (Wahono & Chang, 2019).

An Overview of Mathematics Education in Nigeria

Nigerian system of education had provided that Mathematics be taught at all levels of learning from primary through tertiary levels of education in the country. This was captured in the National Policy on Education (FGN, 2004) which made it vividly clear on the need for the inculcation of Mathematics knowledge for all children of school-going age at primary level (Class 1 to 6) and basic level (JSS 1-3); so as to ensure they can be free from numeracy problem. This was again lucidly explained in the revised version of the National Policy on Education (FGN, 2011), when education was categorized into four levels of education in Nigeria as *Early Childhood* (Pre-primary), *Basic Education* (9 years); comprising Primary and Junior Secondary Education, which is compulsory, universal and free, Senior Secondary Education (3 years) and Tertiary Education. It should be noted however, that all these levels of education outlined by both policies cannot be fully attained by the targeted individuals without the instrumentality of mathematics education; owing to the nature of the specializations in every field. For instance, Kurumeh, Omenka and Mohammed (2013) noted that the scientific and technological development of a nation depends on the mathematical knowledge of its citizens. This, according to them necessitated the country to make Mathematics one of the core subjects in both primary and senior secondary school curricula (FGN, 2004). This is to enable individuals at that level to be well grounded in the field of Mathematics so that whichever specialization they may choose later would be easily learnt devoid of any learning constraint.

On the structure of the Mathematics curriculum in Nigeria, Awofala, Ola-Oluwa and Fatade (2012) reported that the new basic education mathematics curriculum has a 3-level structure: *Lower Level Basic Education Mathematics Curriculum* which is for primary 1-3, *Middle Level Basic Education Mathematics Curriculum* which is for primary 4-6 and *Upper Level Basic Education Mathematics Curriculum* which is for JSS 1-3. The curriculum was re-structured in the present format to suit the current need of the mathematics requirement for the country, which according to them has a mandate of making the learners, who must have gone through the 9-year basic education to acquire appropriate levels of literacy, numeracy, manipulative, communicative and life-skills: as well as the ethical, moral and civic values needed for laying a solid foundation for life-long learning as a basis for scientific and reflective thinking. Thus, to enable individuals become enabled to generate employment for themselves and even engage others, they must be made to extol and harness the full provisions of the curriculum right from the outset so that, upon becoming mathematically literate and inclined, the employment they will generate would be sustainable. This will not only be beneficial to them alone, but to the entire community they hailed from. This would help in the improvement of the country's depressed economy



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Snapshot of Nigerian Depressed Economy

Issues and Challenges

The key issues in Science and Mathematics education centered on funding. Thus, if funding is not sufficient enough, it leads to a number of challenges; such as infrastructural deficit, lack of instructional resources, and inadequate number of professionally trained teachers. Others are inadequate ICT facilities, prevalence of insecurity, and poor supervision amongst others. Therefore, these issues and challenges were carefully looked at as they each affect funding and dissemination of science and Mathematics knowledge as the drivers of nation's growth and development scientifically, technologically and economically as well.

Funding

In terms of funding, many scholars, both in Nigeria and beyond, were unanimous that one of the key indices central in entrenching a globally competitive Science and Mathematics education is funding (Maginson, 2022; Akinola, 2021). For instance, in their study, Sodangi, Isma'il and Abdulrahman (2022) stressed the need for adequate funding of public secondary school Science and Mathematics teachers because of its centrality in professional development and career progression. However, they argued that, over the years, lack of adequate funding hampered the progress of Science and Mathematics teachers professionally and most of the teachers missed a number of professional opportunities in Zamfara state occasioned by poor funding. Similarly, Abubakar and Olamoyegun (2023) argued that adequate funding is the solution to a number of problems bedeviling Science Education in Nigeria. Using secondary data in the study, the findings revealed that if funds are made available to secondary schools, it would address problems of teachers, facilities as well as laboratory equipment.

Infrastructural Facilities

In terms of infrastructure, many of the office buildings in our schools today are dilapidated, Science and Mathematics laboratories are worn out and libraries – housing Science and Mathematics books are virtually non-existent; where they are found available, there are no books or the collections are obsolete, and not in tune with the current challenge our society faces. In view of this, Kola, Gana and Olasumbo (2017) argues that, unless infrastructural facilities are made available and accessible to students, learning under conducive atmosphere as well effective secondary school teaching would be an illusion. Therefore, infrastructure plays an important role in addressing most of the problems within the school. Thus, on their part, secondary school Science and Mathematics teachers perform optimally if the provision of adequate and sufficient infrastructure is ensured (Egede & Asabor, 2019; Ma & Hall, 2018); alongside befitting laboratories and libraries capable of addressing our Science and Mathematics needs (Ekpo, 2022; Yeasmin, 2016).

Instructional Resources

Teaching Science and Mathematics in secondary school requires instructional resources in order to concretize the process of learning to the students in order to address the abstraction thoughtfully inherent in Science and Mathematics. In line with this, Santagata and Lee (2021) argued that when teaching/instructional resources are deployed in teaching, the possibility of getting substantial number of students to understand what the teacher is teaching is high. Sirajo and Abdullahi (2023) also believed that availability of instructional resources can influence students' performance in Mathematics in north-western Nigeria. On the contrary, when teaching/instructional resources are short in supply, students tend to be adamant and passive; without feeling the touch of what the teacher is teaching. In his argument, Raya (2017), and Adigun (2020) believed that teaching in secondary school especially in science related subjects such as Mathematics, Biology, Chemistry and Physics, the deployment of sufficient and adequate instructional materials is quite instructive.



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Similarly, Oguntuase, Awe & Ajayi (2013) argued the failure to use such materials as models of shapes in Mathematics, specimens and reagents in biology, conical flask, beaker and Bunsen burner in chemistry and glass block, glass prism and copper wire in physics would ultimately make the lesson less appealing, and the students less passionate and enthusiastic.

Capacity Building Programmes

Teaching and learning is a continuous process. After undergoing the prescribed training to acquire a specific type of qualification, say, NCE, Diploma or Bachelor's Degree, teachers need continuous update of their Science and Mathematics knowledge. And this can be ensured through in-service training and capacity building programmes. Teachers with lower qualifications need to proceed to have next higher qualification to enable them compete favourably amongst their peers; through in-service opportunities. Through funding, opportunities can be made to Science and Mathematics teachers to improve on their skills. In some instances, collaboration could be sought between government and some non-governmental donor agencies like UNICEF, FH360, and UNESCO etc. Therefore, government can leverage on counter-funding from those organizations to help in building the manpower capacity of Science and Mathematics teachers; especially amidst the dwindling resources of government and in the face of enormous challenges in the education sector.

Recruitment of Professionally Trained Teachers

Many research works recently indicated that most of the teachers in secondary schools today are either not professionally trained or they are out rightly not qualified to teach because they lack the requisite knowledge, skills and aptitude to do that (Hobbs, 2013). Similarly, research had shown how inadequate the number of Science and Mathematics teachers are in Nigerian education system and how that had affected many sectors of the country's economy where the services of these experts are required (Olatude-Aiyedun, & Ogunode, 2021; Ogunniyi & Rollnick, 2015). However, it was observed that significant number of Science and Mathematics in schools today doesn't have background neither in Science nor Mathematics but because they could not get jobs elsewhere they are recruited to teach Science and Mathematics.

ICT Facilities

In line with National Digital Economy Policy (2022) enacted, secondary schools are supposed to be equipped with ICT gadgets in order to make their operation seamless. Thus, in order to keep pace with the global trend, whereby everything relies on electronic means, it is imperative to make our education system ICT-compliant. Consequently, National Communications Commission (NCC) in collaboration with Federal Ministry of Communications and Digital Economy to make provision for ICT equipment in some selected secondary schools across the country. This is with a view to bridging the ICT gap amongst our teeming youth in those secondary schools in order to prepare for hand-on opportunities that require competence in ICT, and to enable them to be self-reliant.

Insecurity

In order to ensure the protection of the lives of students and staff across secondary schools, the recent insecurity being experienced in every nook and cranny of the state is unsettling, mind-boggling and, to say the least, disgusting; and it needs to be taken seriously in order to curtail escalation and henceforth deal with the problem decisively. When this is ensured, learning in these schools devoid of any fear, can be guaranteed. The insecurity threat that engulfed the north-western states had made it practically impossible in states like Zamfara to allow its students, in some parts of the state, to have access to schools. For instance, in the aftermath of the incident of kidnapping of some students at GSS Kaya, the state set up a committee to advise the government on what to do to address the problem. After careful assessment, the committee developed a criteria for classifying the state's schools based on their location, vulnerability as well as accessibility to the bandits.



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Consequently, the state stratified the secondary schools in the state in three categories: red, yellow and white. Those identified and tagged as red are the most vulnerable ones and the committee advised the government to close them immediately to avoid further attacks and kidnappings. Those identified as yellow were considered potentially vulnerable, and the committee advised the government to be vigilant on them and provide necessary additional security personnel in order to repel any potential threat to the students and staff of those schools so as to prevent them from total closure like the red ones. As for those marked, identified and tagged as white, they are safe and face no any danger of being attacked or suffer kidnapping. These are mostly the schools located in the urban areas of the state – mostly in local government headquarters and some major towns, where, in the event of any possible attacked, security can be dispatched immediately to neutralize the threat. Now, having painted this ugly picture of security threat bedeviling the secondary schools in the region, envisioning effective administration of these schools requires formidable and concerted effort by government in order arrest the situation and ensure that children of secondary school going age are not prevented or scared away from going to school because of that security.

Supervision

Supervision, when effective, is a vital tool for quality assurance and professional development in education. However, in the context of mathematics and science education in Nigeria, particularly in a depressed economy, it often falls short due to a combination of logistical, financial, and expertise-related challenges, compounded by insecurity. Addressing these supervisory deficits is critical for improving teacher quality, ensuring effective instructional delivery in core subjects like mathematics and science, and ultimately enhancing student learning outcomes across the nation.

Way forward in Funding Science & Mathematics Education

In order to address the lingering crisis of Mathematics and Science education funding in Nigerian educational institutions, the following suggestions are put forward:

1. **Increase funding:** the budgetary allocation to Mathematics and Science education sub-fields should be increased in order to reach the minimum threshold set by UNESCO so that the two fields can be taught properly across all levels.
2. **Infrastructural facilities:** government should provide adequate infrastructure in order to enable Mathematics and Science teachers as well as students have conducive environment and state of the art facilities so as to ensure effective teaching and learning.
3. **Capacity building programs:** regular capacity building programs should be organized for in-service teachers in order to update their teaching capacity. This is especially in the areas of emerging teaching technologies.
4. **Insecurity:** in view of the ravaging security situation in the country, security should be ensured by government in order to allow for uninterrupted teaching sessions in schools and prevent short-cut terms occasioned by insecurity.

Conclusion

The economic challenges in Nigeria present significant hurdles to adequately funding science and mathematics education. However, these challenges also serve as a powerful impetus for innovation and strategic re-evaluation. By prioritizing STEM education in national budgets, fostering genuine public-private partnerships, implementing transparent financial management, and aggressively leveraging digital technologies for both content delivery and teacher professional development, Nigeria can overcome its funding deficits. This holistic approach is essential to equip teachers with the necessary tools and training, create conducive learning environments, and ultimately produce a generation of scientifically and mathematically literate citizens crucial for Nigeria's sustainable development and emergence from economic depression.



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