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Science, Technology and Mathematics Education: A roadmap to Economic growth and Sustainable Development of the Developing Nations

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ABSTRACT

The entire globe is shifting rapidly, so in this fast-paced setting, education is essential for directing and propelling national growth. Education in science, technology, and math stands out in this environment as a beacon that might point the way toward economical and sustainable growth. To succeed in the modern inventive period, one has to be able to extract and apply relevant knowledge, recognize important patterns, and understand the foundations of a range of difficulties. The development of the requisite abilities and knowledge may be aided by science, technology, and math education by highlighting the creation of captivating notions about science, the nature of scientific investigation, and its applications. Science is an approach that focuses on various research methods and tasks related to the development, acquisition, and management of knowledge, skills, aptitudes, and attitudes about the natural factors in the environment. The importance of education, economic growth and sustainability, obstacles to and strategies for achieving economic growth and sustainable development in developing countries, and the connection between STEM education and sustainable economic growth were all examined in this study.

Keywords: Science, Technology, mathematics Education, Sustainable Development

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1. INTRODUCTION

The world is changing quickly, and education plays a crucial role in guiding and accelerating national development in this dynamic environment. In this context, science, technology and mathematics education stands out as a lighthouse that may show the way to socioeconomic and sustainable advancement (Olofin et al, 2023). The most powerful tool available for enacting change is education. It is the greatest investment a nation can make to quickly develop its political, social, economic, and human resources. Education is a method by which people are formally aided via appropriate direction and supervision in enhancing their skills for both their personal and society's benefit (Orikpe, 2013, Bello, 2020). Developing Nation such as Nigeria adopted a National Policy on Education in this regard (Bello, 2020).The policy placed a strong emphasis on developing an individual's physical and mental competency as well as skills in order to give him the means to exist in society and support its advancement (FRN, 2004, Bello, 2020). In order to thrive in the current innovative era, one must possess the ability to extract and apply pertinent knowledge, identify significant patterns, and comprehend the fundamentals of a variety of challenges (The InterAcademy Partnership (IAP), 2021). By emphasizing the formation of compelling concepts about science and the nature of scientific inquiry and its uses, science, technology and mathematics education might potentially aid in the development of the necessary skills and knowledge (The InterAcademy Partnership(IAP), 2021, Onoshakpokaiye, 2021).

Science is a method of undertaking, and it is primarily concerned with different types of investigation procedures and tasks in relation to the growing, obtaining, and managing of information, abilities, capacities, and attitudes about the environmental natural variables (Okoli, Obiajulu & Ella, 2013, Bello, 2020, Avwiri, 2016). According to Bello (2015), technology can be additionally defined as the practical use of scientific knowledge and research to social problems, improving human comfort levels. Using precise, logical, and exact thought processes, mathematics aims to enhance human experience of oneself and the surrounding world, according to Ezenweani (2006). A vital component of human existence is mathematics. In our daily actions, humans use it whether directly or indirectly

(Onoshakpokaiye, 2011, Onoshakpokaiye, 2021). Mathematics is a discipline of science that has to do with numbers and how they operate as well as calculation, computation, and problem solving, according to Roohi (2012). Onoshakpokaiye (2021) and Roohi (2012) posited that mathematics involves the study of amount, space, and structure. It also reveals concealed trends to us, allowing us to make sense of what is happening around us. In order to assess the effects of technological and scientific progress, students will therefore acquire scientific knowledge and abilities through the inquiry process. The term "scientific literacy" describes a person's use of scientific information. It facilitates comprehension of the scientific method and enables the application of evidence-based knowledge to a wide range of problems requiring both individual and group solutions (The InterAcademy Partnership (IAP), 2021)

Science, technology and mathematics are taught in schools as an all-encompassing idea that is utilized to improve sustainable growth and create riches for everyone through industrialization, particularly now that globalization has increased competition. Innocent (2016) reports that a number of nations, including France, Norway, Japan, Finland, Germany, the United Kingdom, China, and the United States, have established distinctive educational programs specifically aimed at young people via science, technology and mathematics training. We must discover ways to increase their competence in science, technology and mathematics education since these fields play such important roles in the growth and prosperity of nations today (Bello, 2020). Hence, as part of a larger framework of the enabling environment, developing nations should think about making capacity-building in science, technology and mathematics education a priority for national socioeconomic growth sustainability.

According to Bello (2015), a variety of obstacles, including insufficient teaching and learning facilities and ineffective delivery of high-quality, sustainable education, particularly in the areas of science, technology and mathematics, impede the expansion of education and social development in developing nations. He went on to say that some of these elements may be the outcome of specific difficulties that curricular problems encountered in classrooms. The problems with the curriculum have been largely ignored while being closely related to global concerns and changes in education.

2. RESEARCH METHOD

This study adopted a descriptive qualitative research design to explore the role of science, technology, and mathematics (STM) education in fostering economic growth and sustainable development in developing nations. The qualitative approach was chosen to enable an in-depth examination of conceptual frameworks, policies, educational practices, and the interrelation between STM education and socioeconomic advancement.

The data used in this research were obtained from secondary sources, including peer-reviewed journal articles, official policy documents such as the National Policy on Education (FRN, 2004), and reports from global institutions like the InterAcademy Partnership (IAP). These sources were analyzed to identify recurring themes, patterns, and arguments related to the impact of STM education on national development.

The method of document analysis was employed to critically evaluate relevant literature. This included thematic coding of content to categorize data under core themes such as the significance of STM education, its challenges in the context of developing nations, and proposed strategic interventions. The validity of the study was ensured by triangulating data across multiple credible sources, thereby providing a holistic view of the subject matter.

Through this approach, the study highlighted the crucial role that STM education plays in developing human capital, stimulating innovation, promoting technological advancement, and driving sustainable economic growth. The research further examined the barriers to effective implementation and offered evidence-based recommendations to enhance the impact of STM education in resource-constrained settings.

3. RESULTS AND DISCUSSION

Education and its significance

Education, in the words of Hornby (2012), is a field of social science that involves teaching and acquiring particular knowledge, beliefs, and abilities. The goal of education is to help individuals become more knowledgeable, physically fit, and morally upright so that they can eventually live happy lives and contribute to the betterment of society as a whole (Herman, 2013). A person is assisted in

realizing his or her potential through the carefully thought-out process of education. Education affects deep knowledge and comprehension in today's environment in order to propel society's citizens toward new knowledge frontiers across a range of domains (Ofordum & Onyekwena, 2019**)**. An individual's personal and societal well-being is greatly impacted by education, which is a basic human right. It has become recognized as a tool for economic, societal, and political growth and transformation, and it is fundamental to encouraging behavioural change in people (Ofordum & Onyekwena, 2019**)**.

The economy must be significantly reorganized, new technologies must be adopted, sustainable patterns of production and consumption must be promoted, and effective management of both people and material resources must be safeguarded (Enrico and Lngeborg, 2015). An individual gains the information and abilities required for long-term sustainability and the advancement of their community or country via education. According to Maclean (2008), education is still seen as the primary key to both economic and social growth, even if there are many other keys to development, such as better infrastructure like ports, highways, telecommunications centers, dams, and the like.

Science, Technology and Mathematics Education

The word science is from the term "scientia" in Latin means "knowledge." It is an organized process that creates and structures knowledge in the form of universe-related explanations and predictions that can be put to the test. According to Ofordum & Onyekwena(2019) science is defined as the area of knowledge or study that deals with a body of information that has been presented in a methodical way to demonstrate how universal laws work. It is the study of natural events by observation, classification, description, experimentation, analysis, and theoretical justification. It is the methodical understanding of the material or physical world that comes from experimentation and observation. According to Uza (2014), applied science is the use of pure science to address real-world issues for people, whereas pure science is the study of nature to satiate curiosity. According to the definition given above, science is the study of how to get proven information by closely observing and evaluating natural phenomena. Science is a practical discipline. Important characteristics like curiosity, perseverance, hard work, objectivity, logic, suspended judgment, open-mindedness, and honesty are linked to the scientific process (Okafor, 2012, Avwiri, 2020). The ultimate purpose of science is to solve scientific problems or to meet human needs.

The goal of science, technology and mathematics education is to communicate science concepts and methods to people who aren't often thought of as belonging to the scientific community. These people could be students, farmers, market vendors, or even an entire community (Aina, 2013). Education in science, technology and mathematics acts as a stimulant to encourage people to think like entrepreneurs. Science, technology and mathematics education provides students with the critical thinking, problem-solving, and creative abilities necessary to recognize market gaps and create novel solutions. Education in science, technology and mathematics also fills in the gaps between theory and practice in real-world situations. Students' learning is enhanced by practical laboratory experiences and group projects, which also challenge them to consider how scientific ideas may be applied to real-world inventions (Olofin *et al*, 2023). Science, technology and mathematics education equips people to adapt to and succeed in a technology-driven labour market at a time when economies are being drastically transformed by fast technological advancements. Aspiring entrepreneurs may create science-based start-ups that fulfill market expectations and handle local difficulties by combining this mindset with a solid foundation in scientific concepts (Ofordum & Onyekwenba, 2019).

The National Policy on Education (Federal Republic of Nigeria - FRN, 2004) defines science and technology education as a part of the educational process that includes, in conjunction with broad education, the study of technologies as well as associated sciences and the gaining of knowledge, understanding, and practical abilities that pertain to careers in various social, economic, and other sectors. Science is the input and technology is the product in the relationship between the two while mathematics is the basis for all sciences without which science and technology cannot exist (Bello, 2015, Onoshakpokaiye, 2021). Hence, science, technology and mathematics education is a type of education that seeks to generate citizens who are knowledgeable about science and who are also prospective scientists and technologists. Technology education facilitates the gaining of both fundamental scientific knowledge and practical, applied skills (Ige, 2013). A sustainable scientific advancement is extremely hard perhaps even impossible, without a solid basis in fundamental mathematical and scientific knowledge (Linda, 2000). Science, technology and mathematics education

offers fundamental and integrated process abilities, which include: assisting in the development of collaborations between the public and private sectors to promote and support general education; encouraging information and communication technology (ICT) at all levels; and acting as an instrument for the gaining of practical abilities and a creation of jobs(Okafor, 2012). The scientific endeavour is an inventive and demanding one. It integrates with technology, which emphasizes innovation and troubleshooting. Thus, sustainable development begins with the harmonious interaction of science, technology, mathematics and society

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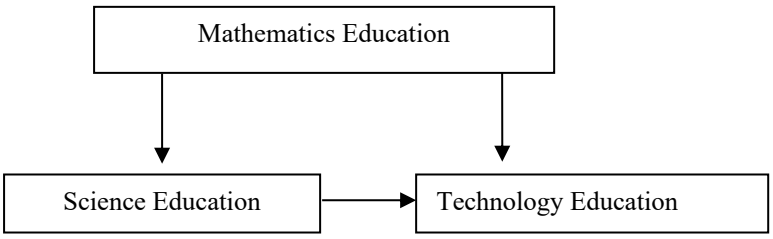

Fig 1.The schematic diagram showing the relationship between mathematics, science and technology education.

Science, technology and mathematics education is a process of teaching or training especially in school to improve one's knowledge about the environment and to develop one's skill of systematic inquiry as well as national attitudinal characteristics (Pember & Humbe, 2009). Gaining the information, abilities, attitudes, and values required to create a sustainable future is made possible via science, technology and mathematics education (Ofordum & Onyekwena, 2019**)**. A variety of important sustainable development issues are incorporated into teaching and learning in this context when we talk about scientific education for sustainable growth, such as reducing the risk of disasters, lowering poverty rates, and climate change.

Science, technology and mathematics education plays a crucial role in determining the direction of the developing countries' economic and sustainable development. This fundamental feature includes a number of important elements that work together to foster the development of a population that is scientifically literate, which promotes creativity, technical advancement, and general socioeconomic growth (Olofin *et al*. 2023). The educational techniques and curriculum serve as the fundamental building blocks of scientific education. The subjects, ideas, and abilities taught to pupils at different educational levels are outlined in the curriculum, which acts as a guide. Students are exposed to the fundamentals of mathematics, physics, chemistry, biology, and other scientific subjects through this program. The curriculum's congruence with national development goals is essential because it guarantees that scientific instruction provides students with the information and skills necessary to meet developing nation's socioeconomic difficulties and ambitions.

In scientific education, pedagogical strategies have a transforming effect. They direct the way in which educators communicate knowledge and motivate learners to interact with scientific ideas (Olofin *et al.*2023). Two essential components of the foundation of scientific education as a vehicle for socioeconomic development requires making sure that it is available to everyone, regardless of gender, socioeconomic status, or geographic location. The developing countries can harness its people resources and create an atmosphere of equal opportunity by resolving inequities and encouraging inclusion. The broad framework that directs the course of scientific education is made up of government initiatives and policies.

Economic Growth and Sustainable Development

According to Bello (2020) sustainable growth is defined as the progress that satisfies current demands without jeopardizing the potential of future generations to satisfy their own. As a result, growth that could be maintained throughout time is referred to as sustainable growth. Keeping these concepts in mind, development that is sustainable may also be defined as development that builds upon the current while creating an environment that allows generations to come to grow and satisfy their requirements (Bello, 2020). Sustainable development is described as meeting existing demands without

compromising the potential of future generations to satisfy their own needs (Brundtland Commission, 2011, Ofordum & Onyekwena, 2019).

All people will live better lives today and in future generations, to put it another way. Economic, social, and environmental advancements are recognized as essential elements of human progress (Ofordum & Onyekwena, 2019**)**. The goal of sustainable development is to fulfill human needs while protecting the environment so that they may be addressed for future generations as well as the present. It is a pattern of economic growth. Ahuja (2012) emphasizes that economic growth may be measured in the following ways: enhanced human capital improvement; increased food supply and agricultural output; increased income. The initiative, ingenuity, inventiveness, and self-control of those in charge of developmental initiatives are essential to achieving sustainable development. But according to Michael (2012), sustainable development is the capacity to address both the requirements of the present and those of the coming generations. Therefore, sustainability is a process that describes how all facets of human existence are developing and how that is influencing substance. As a result, science, technology and mathematics education for sustainable development fosters skills like critical thinking, envisioning the future, and cooperative decision-making. In the developing nations, Science, technology and mathematics education can help achieve sustainable growth if taking seriously. Science, technology and mathematics Education changes the world both intellectually and physically and is a surefire tool for national progress. Cantner & Pyka (2001) stated that Science, technology and mathematics Education has been identified as a major factor in raising productivity and a crucial long-term lever for prosperity and economic progress.

Sustainable development and the function of science, technology and mathematics education coexistence in peace. Peaceful surroundings are necessary for both sustainable development and economic progress (Ofordum & Onyekwena, 2019**)**. Learning science instills in students some fundamental values, such as respect for others' opinions, cooperation, and open-mindedness. In order to foster peaceful coexistence in society, these good habits formed in school will probably be implemented in later life. Apart from improving citizens and neighbors, high-quality education also contributes to the well-being and significance of social and political life (Ofordum & Onyekwena, 2019**)**. The universe of inquiry and discovery is introduced to pupils through the study of science as a subject. This methodology is expected to foster scientific inquiry among future science graduates. This will result in increased productivity enhancement and technical advancements that will impact the economy.

Relationship between Science, Technology, Mathematics Education and sustainable economic growth

Science, technology, mathematics and innovation policies are not feasible unless they are supported by well-crafted policies that tackle problems like learning, research, and development (R&D) (Orkaa & Kwaghbo, 2011). For this reason, education in developing nations such as Nigeria ought to be focused on preparing students for the industrial, scientific, and technological era in order to promote sustainable development and global competitiveness. Science, Technology and Mathematics Education promote and advances economic and technical advancement both nationally as well as between its citizens. As stated by Linda (2000), this awareness is the result of global movements for mathematics, technology and science literacy, which aims to give the developing nation's future citizens a grasp of technological as well as scientific methods and proof so they are able to make knowledgeable choices on scientific and technological problems, as well as to guarantee that young people going into the country's workforce have the expertise and abilities necessary for fostering economical, scientific, and technological growth.

The focus of science, technology and mathematics education is on developing students' problem-solving and decision-making abilities, which are essential for success in the twenty-first century. There is hardly a facet of everyday existence that science, technology and mathematics have not touched, making scientific and mathematics education especially crucial. Through discoveries, it creates knowledge and gives students the necessary abilities to live a simpler life than they have ever had. According to Juma & Yee-Cheong (2005), a nation’s ability to solve problems and initiate sustainable economic growth is strictly dependent on its capabilities in science, technology and mathematics. Science, technology and mathematics linked to economic growth determine the ability to provide social amenities and adequate infrastructure. Science, technology and mathematics have potentials in

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addressing the challenges associated with poverty and hunger elimination by creating job opportunity, empowering youth with vocational or entrepreneurship skills (Orkaa & kwaghbo, 2011).

Science, technology and Mathematics literacy is essential to the developing nations' economy since they are included in the nation's plan for growth. Industrial development and science, technology and mathematics are so closely related that it is difficult to draw clear boundaries between them. Thus, rather than emphasizing a theoretical approach to instruction or fact memorization, the overwhelming demand for the training of a citizenry who are capable of participating in an increasingly globalized world strongly impacted by technological advances highlights the necessity for qualitative science, technology and mathematics education. Omer (2011) argues that scientific advancements are driving the globalization agenda and the emerging world order of the twenty-first century. Though each country's ability to expand industrially is heavily reliant on its degree of sophisticated science, technology and mathematics, it is important to remember that these fields are essential to the extraction of resources for human consumption. Education in science, technology and mathematics will make the developing nations' current state of technological progress possible.

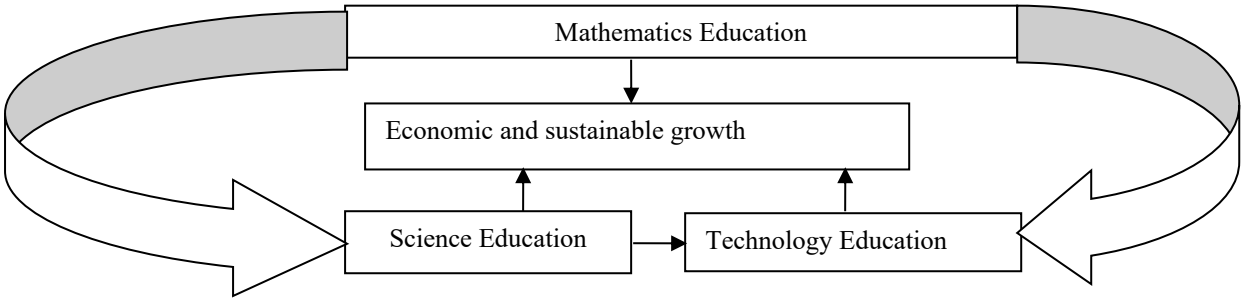

Fig 2. Schematic diagram showing the relationship between science, technology, mathematics, economic and sustainable growth.

Science, technology and mathematics education equips people to adapt to and succeed in a technology-driven labour market at a time when economies are being drastically transformed by fast technological advancements. Developing nation can attract investments from tech-centric companies and position itself to be successful on a global scale by developing a workforce with a solid foundation in science, critical thinking, and flexibility. In a nutshell a key component of the developing countries socioeconomic growth and sustainability is the promotion of innovation and technical improvement through science, technology and mathematics education. It produces a generation of creative thinkers capable of using scientific understanding to produce game-changing ideas. The developing nations can unlock the potential of its young to propel technical advancement, boost economic productivity, and establish the country as a leader in the global innovation scene by fostering this innovative culture. Science, technology and mathematics education has enabled many industrialized nations to make great strides in science and technology (Aina, 2013). Any country's progress depends heavily on science, technology and mathematics education in many different ways (Aina, 2013).

Through research, science education opens up new job options. Farming an ecologically friendly agricultural practice that permits the production of crops and animals without endangering human or natural systems is known as sustainable agriculture. Agriculture may modernize and develop technologically as a result of scientific knowledge and abilities. Increased food production, job possibilities, and a decrease in poverty are all results of improved agriculture. Decrease in Poverty One of the main tenets of sustainable development is the decrease of poverty. It is evident that education level affects earned income level (Ahuja, 2012, Ofordum & Onyekwena, 2019).

One fundamental component that has the power to influence the developing nation's socioeconomic growth trajectory is science, technology and mathematics education. Its domain has the capacity to stimulate creativity, enhance technical progress, and develop a workforce competent in navigating the intricacies of a world changing quickly. Economic growth is fueled by innovation, which comes from a population that is knowledgeable about science and capable of critical thought. Developing nations may improve its competitiveness internationally by finding innovative answers to

urgent problems and fostering a culture of inquiry and exploration via scientific and mathematical education (Olojo et al., 2022). A flourishing economy's ability to advance technologically depends on the basis that scientific and mathematical education provides. Giving people the skills to understand and use science opens opportunities to breakthroughs in a variety of fields, including agriculture and healthcare.

Using scientific education as a strategy to achieve socioeconomic development in developing nations is centered on promoting innovation and technological improvement. In a period of fast technological development, this symbiotic link between scientific and mathematics education and innovation has the potential to move the country ahead. A culture of invention is constructed on the foundation of science, technology and mathematics education. A strong grasp of scientific concepts, critical thinking ability, and problem-solving skills are all provided by science, technology and mathematics education, which fosters the kind of thinking required for creative inquiry. It promotes experimentation, curiosity, and the guts to defy accepted wisdom—all essential elements of an inventive environment. It is impossible to overstate the value of mathematics in daily life. Nobody on the planet could survive without mathematics; it has become a need for daily existence. Today, it is a vital instrument for the advancement and sustainable growth of the entire planet (Roohi, 2012, Onoshakpokaiye, 2021)). The majority of occupations rely heavily on mathematics skills and expertise, particularly in science as well as other disciplines involving calculations. Amarjeet et al. (2016) states that mathematics is crucial for the organization and dissemination of knowledge. It offers a strong, concise, and generally clear approach in this area. Many parts of the physical cosmos may be predicted and explained by mathematics. It is an activity that involves solving problems and is backed by a wealth of information. Every fruitful future is unlocked by mathematical proficiency, while doors are closed by a deficiency in the subject (Onoshakpokaiye, 2021).

Innovation with a foundation in science, technology and mathematics education has the power to revolutionize a number of industries. Students who are raised with an innovative mindset are more equipped to question established norms and come up with novel solutions. For example, a science-savvy student may come up with creative solutions to problems in energy, agriculture, healthcare, or environmental sustainability. Another direct result of strong science, technology and mathematics education is technological innovation, which makes a significant contribution to developing nations economic expansion. Students gain useful abilities that have real-world implications when they interact with science and technology and mathematics in the classroom. These abilities might include everything from biology and engineering to data analysis and programming. With these skills, graduates may make a significant contribution to the advancement and use of cutting-edge technology (Yabugbe, 2009).

The growth of human capital via science, technology and mathematics education is seen as essential to creating a workforce that is capable and empowered and can successfully negotiate the challenges of developing nations evolving socioeconomic environment. In addition to imparting information, this essential component fosters the practical skills, flexibility, and creative thinking that people need in order to effectively contribute to the growth and development of their country. A broad range of abilities that go beyond the study of science, technology and mathematics are acquired via scientific and mathematics education. Among the cognitive skills developed during science, technology and mathematics education include interpreting information, logical problem-solving, and the ability to think critically. These abilities serve as the cornerstone of a skilled workforce that can handle complex problems in a variety of sectors. People who are educated in science, technology and mathematics are more equipped to interact with and adjust to the swift advancements in technology that characterize the current period.

A solid foundation in science, technology and mathematics enables people to embrace lifelong learning and stay relevant in a changing labour market and as industries change and new disciplines develop. Additionally, scientific and mathematics education fills in the gaps between information gained theoretically and its practical application. Practical experiences in the lab, real-world projects, and group research foster a feeling of pragmatism while simultaneously enhancing comprehension. Employers significantly evaluate graduates' capacity to apply what they have learned to real-world circumstances in addition to their academic achievements (Olojo et al., 2022). The problem of unemployment is also addressed by developing a trained labour force. Graduates from strong scientific programs are highly skilled in industries that are in demand, including engineering, technology, medical

care, and others. As a result, unemployment rates are lowered as the demands of the labour market are met and a pool of qualified candidates is assembled. It is essential that science, technology and mathematics education be integrated with business demands (Amaka & Uju 2019)

Hindrances and Way Forward towards Economic Growth and Sustainable Growth of the Developing Nations

There are several difficulties in the developing nations' socioeconomic structure. One major obstacle is the lack of appropriate access to high-quality education, especially in rural and underprivileged regions. A lack of modern tools and scientific labs makes it difficult to offer science, technology and mathematics instruction in an efficient manner. Inequalities are made worse by gender differences in educational attainment, which limits the potential contributions of a sizeable section of the population. Additionally, there is a clear disparity in opportunities and access to education due to economic inequality. The practical relevance of scientific information is limited by a lack of strong integration between academics and industry, which impedes the creation of novel solutions suited to regional problems. Insufficient funding for research and development also hinders the growth of domestic innovations and solutions. Notwithstanding these obstacles, scientific and mathematics education has the potential to unlock a wealth of opportunities in developing countries socioeconomic environment.

Nevertheless, despite the efforts of several governments and institutions, the benefits of Science, technology and mathematics Education are still not widely felt in many developing countries. However, many developing countries' science and mathematics teacher unemployment rate hasn't produced the innovative experts and trained human capital needed to turn the country's condition around (Ofordum & Onyekwena, 2019). Various obstacles have been identified as impeding Science, technology and mathematics Education. These include ongoing labour disputes, insufficient financial resources, and issues with curriculum and examination malpractice, low teacher quality, instructional strategies, inadequate assessment of physical facilities, and the attitudes of educators (Asuquo, 2002; Nwachukwu, 2012, Akpan, 2008, Ofordum & Onyekwena, 2019). These and several other issues demonstrate how inadequate the developing countries educational system is. Thus, for the country to undergo the required change, all parties involved must work together in harmony. The federal government's transformation plan and brain awards program are positive moves, but meaningful advancements won't come unless such initiatives are supported by efficient and pertinent education. After that is finished, scientific and mathematics education may be employed as a tool to accomplish sustainable development in areas such as research, agriculture, rural development, peaceful coexistence, poverty reduction, health, and nutrition (Obi & Obiadazie, 2014).

In order to handle the developing nations enormous natural resources responsibly, a thorough comprehension of scientific concepts is required. Future leaders and politicians can be better prepared to find a harmonious equilibrium between environmental sustainability and economic growth by obtaining an education in science, technology and mathematics. One of the main pillars of society well-being, healthcare, greatly benefits from a scientifically educated population. Science, technology and mathematics education is the foundation for innovations that improve public health, lower mortality rates, and increase worker productivity, ranging from medical research to the creation of novel remedies (Omotayo, 2010, Olofin, Ogunjobi, Falemu & Akinwumi,2023)).

Developing nations needs a strong science technology and mathematics education environment in order to make its mark on the world arena. A population with a strong scientific and mathematics literacy promotes economic growth through international collaborations, research alliances, as well as access to worldwide marketplaces in a connected globe. Many developing nations want to end poverty, while science technology and mathematics education appears to be a key component of that transition. This educational paradigm opens doors to socioeconomic mobility and breaks the cycles of poverty by providing underprivileged groups with scientific knowledge and skills. Cooperation is necessary if scientific and mathematics education is to reach its full potential. Sufficient allocation of resources towards educational infrastructure, curriculum modifications that emphasize experiential learning and critical thinking, continuous professional development for the science and mathematics educators, and public advocacy are essential in steering developing countries in the direction of a future where science technology and mathematics education serves as a fundamental component of the country's socio-economic progress rather than merely an aid (Rising, 2009, Olofin *et al*, 2023)).

A dedication to fostering the next generation of scientists, innovators, and leaders who will propel developing nation's socioeconomic progress and change is demonstrated by investments made in education, especially in the sciences, technology and mathematics. To put it briefly, the basis of scientific, technological and mathematics education in developing countries is a complex system that includes infrastructure, pedagogy, curriculum, teacher development, inclusion, and government assistance. In addition to providing people with scientific information, laying a solid foundation enables people to actively participate in socioeconomic development through creativity, technical advancement, and the development of solutions specifically suited to developing nation's particular problems (Amaka & Uju 2019). In light of these circumstances, scientific education function as a vehicle for attaining socioeconomic development has more relevance as it works to address current issues while seizing future prospects.

By collaborating with businesses, academic institutions, and international networks, scientific and mathematics education may become more relevant to the real world and better meet the demands of the changing labour market. These kinds of relationships also pave the way for the sharing of best practices, research collaborations, and information exchange. Science technology and mathematics education shows promise as a powerful tool for solving these issues and taking advantage of the numerous opportunities. Science technology and mathematics education has the power to spark a revolutionary path towards sustainability socioeconomic growth by expanding access, encouraging innovation, connecting academics and industry, and utilizing collaborative networks.

The younger generation offers a large pool of potential employees that are ready to interact with research and support economic expansion. Technological and communication innovations provide new channels for sharing educational materials, overcoming distances, and democratizing knowledge access. The nation's wealth of natural resources, which include minerals and agriculture, provide an ideal environment for scientific research and development (National Institute of Open Schooling, 2023). Education in science, technology and mathematics may encourage sustainable behaviours, guaranteeing prudent resource management that promotes long-term growth.

4. CONCLUSION

In conclusion, scientific education fosters the growth of human capital and the creation of a workforce that is informed, adaptable, and progressive. This workforce possesses the skills necessary for creativity, problem-solving, and major contributions in a range of sectors in addition to their understanding of science, technology, and mathematics. Science, technology, and math education need to be given higher priority if sustainable growth is to take place. By investing in science education, the developing country may secure a more bright and prosperous future for its citizens and contribute to their socioeconomic progress.

REFERENCES

Agu, U. (2017). *Science teaching in Nigeria* (2nd ed.). Stirling Press.

Ahuja, H. L. (2012). *Modern economics* (pp. 727–731). S. Chard Company Ltd.

Aina, J. K. (2013). Importance of science education to national development and problems militating against its development. *American Journal of Educational Research, 1*(7), 225–229. https://doi.org/10.12691/education-1-7-2

Akpan, B. B. (2008). *Nigeria and the future of science education*. Oluseyi Press Ltd.

Amaka, M., & Uju, E. (2019). *Socio-economic development*. National Open University of Nigeria. https://nou.edu.ng/coursewarecontent/DES222%20Technology%20and%20Socioeconomic%20Development.pdf

Amarjeet, M., & Malik, A. K. (2016). The role of mathematics in entrepreneurship. *International Transactions in Mathematical Sciences and Computers, 9*(1–2), 92–96.

Asuquo, L. (2002, March 6). We are head in science and technology. *Daily Champion*, p. 30.

Avwiri, H. E. (2016). An investigative study on students' preconception and level of assimilation of science-related subjects. *International Journal of Innovative Social & Science Education Research, 4*(4), 1–7.

Avwiri, H. E. (2020). Relative effectiveness of co-teaching and solo-teaching on students' achievement in chemistry. *Journal of Science, Technology and Education, 8*(2), 69–75.

Bello, M. A. (2015). Fostering innovative teaching and creative learning in science and technology education: The vision for national development. *The Knowledge Resort: A Biannual Journal of School of Education, 1*(22), 201–209.

Bello, M. A. (2020). Restructuring science and technology education towards achieving 2030 education agenda for industrialization and sustainable development in Nigeria. *Villanova Journal of Science, Technology and Management, 2*(1), 11.

Brundtland Commission. (2011). *New growth theory, technology and learning: A practical guide* (Review of economic development literature and practice, No. 4). U.S. Economic Development Administration.

Cantner, U., & Pyka, A. (2001). Classifying technology policy from an evolutionary perspective. *Research Policy, 30*(5), 753–772.

Enrico, G., & Ingeborg, N. (2015). The role of science, technology and innovation policies to foster the implementation of the sustainable development goals (SDGs). *Report of the Expert Group Follow-up to Rio +20*.

Ezenweani, U. L. (2006). *Mathematics and classroom teaching*. Delsu Press.

Federal Republic of Nigeria. (2004). *National policy on education*. NERDC Press.

Herman, T. H. (2013). *Teaching physical and health education in department of education and science education in the primary school years*. HMSD Press.

Hornby, A. S. (2012). *Oxford advanced learner's dictionary* (12th ed.). Oxford University Press.

Ige, A. M. (2013). Repositioning science and technology education for sustainable development in the 21st century: Nigeria's case. *Journal of Sustainable Development in Africa, 15*, 154–172.

Innocent, O. (2016). Managing the role of science and technology education programs in promoting enterprises for national development in Nigeria. *International Journal of Scientific Research in Education, 9*(2), 97–104.

Juma, C., & Yee, C. (2005). *The new bioeconomy: Industrial and environmental biotechnology in developing countries*. United Nations Conference on Trade and Development.

Linda, C. (2000). *Participation in science, engineering and technology at school and in higher education*. Centre for Educational Sociology, University of Edinburgh.

Maclean, P. (2008). Education for peace building and sustainable development: Delusion, illusion, reality. http://www.danepraire.com

Michael, T. N. (2012). *National policy in education (2004)*. Nigeria in Education Research Development Council (NERDC). Yaba Press.

National Institute of Open Schooling. (2023). *Socio-economic development and empowerment of disadvantaged groups*. https://www.nios.ac.in/media/documents/SecSocSciCour/English/Lesson-25.pdf

Nwachukwu, C. O. (2012). Revisiting science education and national development: Nigerian situation and the way forward. *Kuwait Chapter of Arabian Journal of Business and Management Review, 1*(10), 1–21.

Obi, Z. C., & Obiadazie, R. E. (2014). Science education for sustainable development: A need for Nigeria. *COOU Interdisciplinary Research Journal, Maiden Edition,* 46.

Ofordum, M. C., & Onyekwena, C. N. (2019). Science education: A tool for sustainability in Nigeria's development. *Multidisciplinary Journal of Education, Research and Development, 3*(1), 71.

Okafor, J. O. (2012, March 26–29). Transforming the Nigerian nation through science, technology and mathematics education. Paper presented at the 2nd Annual Conference of School of Sciences, Federal College of Education, Obudu, Cross River State, Nigeria.

Okoli, S. O., Obiajulu, A. N., & Ella, F. A. (2013). Science education for sustainable development in Nigeria: Challenges and prospects. *Academic Journal of Interdisciplinary Studies, 2*(6), 159–165.

Olofin, S. O., Ogunjobi, A. O., Falemu, F. A., Akinwumi, I. O., & Olumilua, B. (2023). Science education as a tool for achieving socio-economic development of Nigeria. *International Journal of Development and Economic Sustainability, 11*(4), 33–44.

Olojo, O. O., Akinwumi, I. O., & Olofin, S. O. (2022). Comparative analysis of secondary school students' performance in science subjects in Ekiti State, Nigeria. *British International Journal of Development and Economic Sustainability, 10*(3), 73–84. https://doi.org/10.37745/bje.2013/vol10no300.73-84

Omer, A. N. (2011). Role of technical scientific research education in sustainable development and conservation in Sudan. *Journal of Educational and Social Research, 1*(3), 22–26.

Omotayo, K. A. (2010). Acquisition, improvisation and maintenance of science apparatus. In Jegede & Omotayo (Eds.), *Science education and science teaching methods series 1* (pp. xx–xx). Greenline Publishers.

Onoshakpokaiye, E. O. (2011). The influence of teachers' attitude on students' learning of mathematics in Nigerian secondary schools. *Journal of Research in Education, 2*(1), 15–21.

Onoshakpokaiye, O. E. (2021). Functional mathematics education: A tool for developing entrepreneurship for sustainable self-reliance of Nigerian graduates. *Contemporary Mathematics and Science Education, 2*(1), ep21003. https://doi.org/10.30935/conmaths/9678

Orikpe, E. A. (2013). Education and national security: Challenges and the way forward. *Journal of Educational and Social Research, 3*(10), 53–65.

Orkaa, B. S., & Kwaghbo, I. A. (2011, April 19–21). Science and technology education: A panacea to national development in Nigeria. Paper presented at the 3rd National Conference of the School of Sciences, College of Advanced and Professional Studies, Markudi.

Pember, S. T., & Humbe, T. T. (2009, October 6–9). Science education and national development. Paper presented at the ASSUTIBS Maiden National Conference, COE Kastina–Ala.

Roohi, F. (2012). Role of mathematics in the development of society. *National Meet on Celebration of National Year of Mathematics-2012*. NCERT.

The InterAcademy Partnership. (2021). *Science education: Purpose, methods, ideas and teaching resources*. https://www.interacademies.org/news/what-purpose-science-education

Uza, D. V. (2014). Science and technology: Key to our national development. http://www.commonwealthministers.com/special-reports/science-and-technology-key-to-our-national-development

Rising, A. (2009). The implications of ICT and simulation for science teaching: Whither Nigeria. *Complex Systems Publications, 17*(1), 113–124.

Yabugbe, A. (2009). Recent advances in science teaching in Nigeria. *Journal of Teaching and Learning, 3*(1), 6–10.