



Elevating Kwara State Economy Through Science Education

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Abstract

This paper explores the pivotal role of science education in fostering economic growth in Kwara State. It assesses the current state of science education, addressing challenges faced by students and teachers. Emphasizing the fundamental nature of Sciences in driving innovation, the study explores how science education cultivates a culture of scientific research and equips the workforce for global opportunities. The paper underscores the contribution of science education to economic growth and sustainability in Kwara State, advocating for strategic investments. The conclusions discuss challenges in implementing effective science education programs and offer recommendations.

Keywords: Sciences Education, Innovation, Economic Growth, Global Economy, Kwara State

Introduction

Education is regarded as a tool that equips learners with the skills they need to excel in whatever career path they choose (Bhat & Khandai, 2016). Kwara State, one of the 36 states in Nigeria, is located in the North-Central part of the country. It is known for its rich natural resources, such as gold and limestone, among others. Despite the availability of these resources, the state's economy remains underdeveloped, marked by high unemployment and poverty rates. There is a pressing need to utilize education, particularly science education, to equip individuals with the knowledge, skills, and innovative mindsets necessary to promote economic growth, foster sustainable development, and address societal challenges (Biasutti et al., 2018; Anyolo et al., 2018). Science education plays a crucial role in elevating the economy by fostering innovative thinking, and problem-solving skills, and preparing individuals for careers in STEM-related professions (Gough, 2016; Gustafsson et al., 2015). This can be achieved by integrating higher-order thinking skills into science teaching and equipping students with the tools necessary to tackle real-world challenges, thereby contributing to the prosperity of the state (Dahlan, 2020). Science education nurtures creativity, exploration, and innovation in individuals with a passion for economic growth. It is also relevant to the state's growth as it helps maintain its wealth and serves as a pathway for job creation, reducing crime rates and providing solutions to the socioeconomic problems confronting the state. As a result, society has become more scientifically literate (Retnawati et al., 2018).

Science education serves as a means of empowerment, cultural preservation, participation, and equity (Emmanuel, 2013). Science, as a subject, describes the nature and properties of matter and is essential for most science-based courses. It plays a significant role in human survival, being the foundation for the production of food, drugs, and materials used in day-to-day activities (Cerminara et al., 2020). There is a clear link between science and society, as well as between science, technology, and innovation. Science plays an important role in economic growth and development, as seen in the production of clothing, buildings (housing), transportation, and more (Adam et al., 2020). Despite the abundant resources in Kwara State, the state continues to struggle with economic underdevelopment, marked by high unemployment and poverty rates. Recognizing the potential of science education to transform the state's economy, this paper aims to explore the pivotal role of science education in catalyzing economic growth and prosperity in Kwara State. Strategic investment in science education can pave the way for job creation, innovation, and poverty alleviation, charting a path towards a more vibrant and resilient economy for the people of the state.

In light of the foregoing, the specific objectives of this paper are to:

1. Analyze the importance of science education in the economic development of Kwara State.

2. Recommend relevant policy implementation strategies for economic growth in Kwara State.
3. Explore how science education can be adequately integrated for economic development in Kwara State.

Current State of Education in Kwara State

Kwara State's education system faces significant challenges, particularly in inclusiveness and accessibility. Despite various government initiatives, the implementation of inclusive education policies remains largely unfulfilled, leading to a high number of out-of-school children.

Key Issues:

- **Out-of-School Children:**
 - UNESCO reports over 10.5 million out-of-school children in Nigeria. It is estimated that 5 to 7 million of these are children with disabilities.
 - The World Bank and WHO project that 15% of populations in developing countries are people with disabilities, with 80-90% lacking access to basic education.
- **Infrastructure and Accessibility:**
 - Public primary and secondary schools in Kwara State are mostly inaccessible to children with disabilities.
 - Schools lack inclusive infrastructures like accessible classrooms, playgrounds, and toilets.
- **Teacher and Institutional Capacity:**
 - There is a shortage of well-trained teaching and non-teaching staff.
 - Low institutional capacity to implement inclusive education effectively.
- **Policy and Legal Frameworks:**
 - Although Kwara State has initiated policies on inclusive education, their implementation is inadequate.
 - The need for stronger legal and policy frameworks to guide statutory planning, budgeting, and standard regulation is critical.
- **Public Awareness and Commitment:**
 - Low public awareness on issues of inclusive education among officials, professionals, parents, and stakeholders.
 - Insufficient collaboration among stakeholders to make schools inclusive and accessible.
- **Special Needs Schools:**
 - Kwara State has only seven special public and private schools for children with disabilities, with a combined capacity of about 2,000 pupils.
 - These schools often lack basic infrastructure, are located in remote areas, and are poorly equipped and staffed.
- **Higher Education and Training:**
 - Only one tertiary institution in Kwara State (Kwara State University) offers comprehensive academic and professional programs in special/inclusive education.
 - Limited opportunities for capacity building and professional training for educators and support staff.

Science Education and Economic Development

Science education instills a variety of essential skills in individuals, such as observation, measurement, communication, recording, experimentation, controlling variables, questioning, prediction, understanding relationships, space and time, inference, and model formulation (Cirfat, Zумыil, & Metshak, 2007). For example, observation involves a meticulous examination of an object or aspect to gather valuable information, often forming the foundation for scientific activities or discoveries. Measurement, another vital skill acquired through school scientific experiments, entails using measuring tools to describe an object's properties, such as size, volume, length, height, and area. Additionally, prediction enables individuals to infer or forecast environmental events. The primary objective of science education is to instill necessary facts, skills, processes, and attitudes in students, preparing them effectively for the contemporary industrial economy. The goals of modern science education are stated as follows:

- Developing rational thinking skills in learners.
- Fostering the ability and confidence in students to inquire.
- Enhancing understanding of the changing environment in terms of mathematics, life, energy, and their interactions.

Similarly, the National Policy on Education (2004) in Nigeria specifies the goals of science education as:

- (i) Cultivating an inquisitive, knowledgeable, and rational mindset conducive to a good life and democracy.
- (ii) Producing scientists to drive national and technological development.
- (iii) Providing knowledge and understanding of the complexities of the physical world, including its forms and the conduct of life.

Globally, the study of science is being promoted and supported by governments and various agencies to produce scientists who can drive national development. When students learn to apply the scientific facts and procedures taught in the classroom to real-world social and practical settings, sustainable development can indeed be achieved.

Science Education: A Tool for Achieving Sustainable Development in Nigeria

Science education is a crucial instrument for national development, contributing to both intellectual and physical transformations. Cantner and Pyka (2001) emphasize that science education is a key driver of productivity and a significant factor in long-term economic growth and prosperity. It is considered essential for achieving the 2030 Sustainable Development Goals (SDGs) because it fosters economic growth and environmental sustainability, develops innovative and sustainable methods to meet human needs, and empowers individuals to shape their own futures (Enrico & Ingerborg, 2015). According to the European Union's 2030 Agenda, science education offers several opportunities, such as driving economic growth, enabling effective regulatory and governance frameworks, and promoting cooperation and partnerships between various stakeholders. However, in Nigeria, the benefits of science education are not yet fully realized despite efforts by the government and various agencies. The issue of unemployment among science teachers has hindered the production of skilled human capital and creative professionals necessary for national prosperity. Key challenges facing science education in Nigeria include frequent strike actions, inadequate funding, examination malpractice, curriculum issues, the quality of teachers, teaching methods, poor evaluation, lack of physical facilities, and teachers' attitudes (Asuquo, 2002; Nwachukwu, 2012; Akpan, 2008). These challenges indicate that the educational system in Nigeria is currently inadequate. Therefore, concerted efforts by all stakeholders are necessary to bring about the desired changes in the country. The federal government's transformation agenda and brain awards program are positive steps, but significant progress can only be achieved through effective and relevant education. When these efforts are successfully implemented, science education can serve as a tool to achieve sustainable development in various aspects of life, including peaceful coexistence, research, agriculture, and poverty reduction.

Importance of Science Education in the Economic Development of Kwara State

Science education will help foster economic development and prosperity in Kwara State by driving innovation, job creation, and sustainable growth across the state. Through effective collaboration with the right partners, science education can address socioeconomic challenges and propel Kwara State toward a brighter future. Science education serves as the foundation for innovation and technological advancement across various industries. From petroleum refining to agriculture and pharmaceuticals, science education underpins critical processes and product development. In achieving a state with economic growth that fosters poverty eradication, a skilled workforce with a strong foundation in science will help boost productivity, efficiency, and competitiveness in key sectors of Kwara State's economy.

Below are some of the ways in which science education can contribute to Kwara State's economy:

- **Agricultural Advancement:** Science education equips individuals with the knowledge and skills necessary for enhancing agricultural productivity. Understanding soil science, fertilizer composition, and pesticide application methods is crucial for optimizing crop yields. In Kwara State, where agriculture is a primary economic activity, proficient knowledge in agricultural science can lead to increased yields, improved crop quality, and ultimately higher incomes for farmers.
- **Industrial Development:** Science forms the backbone of industrial processes and innovations. With an educated workforce in science, Kwara State can attract investments in industries such as pharmaceuticals, petrochemicals, and food processing. Skilled chemists contribute to research and development, product formulation, quality control, and environmental sustainability within these industries, stimulating economic growth through job creation and value addition.
- **Environmental Management:** Science education empowers individuals to address environmental challenges effectively. In Kwara State, where issues such as pollution, waste management, and water purification are prevalent, trained scientists can devise sustainable solutions. Implementing environmentally friendly practices not only safeguards public health but also attracts eco-conscious

investors, fostering a conducive business environment and promoting economic growth and sustainability.

- **Global Competitiveness:** By prioritizing science education, Kwara State can enhance its competitiveness on the international stage. Well-trained scientists can contribute to research collaborations, technology transfer, and participation in global value chains, positioning the state as a hub for innovation and knowledge-based industries.
- **Innovation and Entrepreneurship:** A solid foundation in science education cultivates a culture of innovation and entrepreneurship in Kwara State. This nurtures an ecosystem that encourages scientific research and technological innovation, leading to the emergence of startups and small businesses. These ventures, fueled by scientists' creativity and expertise, have the potential to introduce novel products, processes, and services, thereby diversifying the economy toward growth.

Strategies for Economic Growth in Kwara State

To achieve economic growth in Kwara State, which has vast potential through its rich agricultural base and industrial sectors, it is necessary to harness the power of science education. Below are strategies to drive the state's economic growth:

Curriculum Enhancement: Introduce practical, industry-relevant modules in the science curriculum tailored to the needs of the state's economy. Emphasis should be placed on hands-on learning experiences, laboratory experiments, and fieldwork to foster practical skills and problem-solving abilities among students. Incorporating interdisciplinary approaches by integrating science with agriculture, engineering, environmental science, and business management will promote a holistic understanding and application.

Teacher Training and Capacity Building: Specialized training programs for science educators should enhance their pedagogical skills, content knowledge, and proficiency in teaching the practical application of science.

Community Engagement and Outreach: Initiatives such as science fairs and career guidance programs can raise awareness about the importance of science education and its role in economic development. Promoting inclusivity, diversity, and gender equity in STEM education will ensure equal opportunities for all individuals to participate and contribute to Kwara State's economic growth.

Infrastructure Development: Laboratory facilities in schools and tertiary institutions should be upgraded to meet international standards with modern instruments, safety protocols, and resources for conducting experiments and research. Establishing specialized research centers within the state will also enhance outcomes that could pave the way for solving economic development challenges in the state.

Integration of Science Education in the Economic Development of Kwara State

Science education serves as a pillar in societal development. Having an inclusive science education curriculum will foster development and improve the state's economy. It is necessary to refine and upgrade the secondary school science curriculum by restructuring the practical aspects to encourage improvisation, self-development, and entrepreneurship skills that will promote the development of Kwara State. To improve the economic growth of Kwara State, science education can be effectively integrated in the following areas:

Hands-On Learning: Emphasize practical, hands-on learning experiences in laboratory settings. This will help students develop essential laboratory skills and critical thinking abilities while familiarizing them with modern laboratory techniques and equipment used in industries. Engaging in experiments and demonstrations can spark students' interest and passion for science.

Sustainable Development and Environmental Conservation: Science education promotes an understanding of sustainability principles and environmental awareness. Sustainable practices are necessary to promote economic growth. This is possible through green science concepts and renewable energy that encourage the reuse and recycling of waste products to reduce environmental hazards. Science education will promote environmental conservation and waste management, encouraging a waste-to-wealth approach that will improve the state's economy.

Study Area: Kwara state is a state in Nigeria, bordered to the east by Kogi state, to the north by Niger state, and to the south by Ekiti, Osun and Oyo states respectively. It has an international border with the Benin Republic, Kwara state has its capital city as Ilorin with 16 local government areas, the state was created on 27th May 1967, it has a total area of 36,825km² and an estimated population of 3.3 million people as of 2006 population census statistics. Economically, Kwara state is largely an agriculture state coupled with animal rearing, buying and selling of farm produce and industry-produced goods.

Conclusion

Sciences education catalyzes economic growth and development in Kwara State. By investing in quality education and infrastructure, fostering research and innovation, and promoting public-private partnerships, the

state can leverage its human capital and natural resources to realize its economic potential. Through a concerted effort to prioritize science education, Kwara state can position itself as a dynamic hub for scientific excellence, technological innovation, and inclusive prosperity through collaborative efforts involving government, academia, industry, and civil society.

Recommendations

The following recommendations were made from this paper.

1. Investment in infrastructures: There is a need for the government to build science laboratories and research centres and more classrooms equipped with modern facilities which the teacher can use to teach the students about how Science Education can improve and empower the students hereby improving the stand of living probable economic growth.
2. Training and Teacher Development: The government should ensure Science Educators are exposed to training regularly in their field to have exposure to the current trend and in return, they will be able to teach the students what is needed for development and growth.
3. Partnership with local industries: There should be a partnership between educational institutions and local industries to provide students with practical experience and exposure to real-world challenges. Collaborations on research projects, internships and training programs should be encouraged so as to enhance students skills and employ ability.

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