SCIENCE AND TECHNICAL EDUCATION: TOOLS FOR NATIONAL DEVELOPMENT

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ABSTRACT
Science and technical education in Nigeria are facing challenges as a result retarding national development. Nigerian educational institutions are producing graduates without adequate acquisition of scientific and technical skills that can pave the way for self-reliant or job opportunities for socio-economic progress. The rate of unemployment rate in Nigeria has seriously increased to 33.5% in 2022 while the number of Nigerians living in poverty is 14.7 percent (%) from the 2018/2019 figure of 82.1 million to the projected 95.1 million in 2022. This paper examines science and technical education as tools for national development. It further discusses the concepts, roles and challenges of science and technical education in Nigeria. It recommended among others that science and technical education policies should be adequately implemented by government to achieve the objectives of national development.

Keywords: Science and Technical Education, History, National Development, Roles and Challenges.

INTRODUCTION
Education plays a significant role in national development of a country. It is obvious that education has occupied a central position in the priority list of many countries of the world in their pursuit for scientific, technological and socio-economic progress. However, it is very worrisome to see how Nigerian students graduate from schools and colleges without relevant occupational skills to secure jobs in the labour market. Therefore, over the years, school leavers and graduates of tertiary institutions have not secured employments (Victor & John, 2022). Moreover, in 2022, the unemployment rate in Nigeria is estimated to reach 33 percent. (Sasu Doris, 2022). In addition, data shows that the unemployment rate in Nigeria rose constantly in the past years and in the fourth quarter of 2020 over 33 percent of the labour force was unemployed according to World Bank, 2022.
According to World Bank, (2022) other African countries with high rate of unemployment include:

a. South Africa (33%)
b. Djibouti 28%
c. Eswatini 25%
d. Botswana 24%
e. Lesotho 24%
f. Congo Republic 23%
g. Gabon 22%
h. Somalia 20%
i. Sudan 19%

From all indications, it is imperative to say that one of the major causes is that science and technical education have not been enhanced through Nigeria's educational system. If science and technical education are given the right place in Nigeria, our developmental objectives will be met effectively in accordance with National Policy on Education (NPE, 2014) of the Federal Government of Nigeria (FGN).

In addition one of the objectives of National Policy on Education (NPE) is to aim and impart necessary skills and knowledge leading to the production of skilled manpower in the area of science and technology. Therefore, Nigerian citizens should be engaged with the relevant occupational skills to secure jobs or to be self-reliant which can be achieved through science and technical education organise by National Business and Technical Examination Board (NABTEB). This is because the philosophy of education in Nigeria is tailored towards social, cultural, economic, political, scientific and technological progress. Therefore, education is adjudged to be an instrument pair excellence for achieving national development (FRN; 2014).
In addition, it is imperative to say that education is a needful instrument in the development of every society. Also, education is an instrument for scientific, technological advancement and socio-economic reconstruction, and a means of developing qualities that end up in building up a rich and fulfilled life (Muhammed, Yusha' u and Lawal, 2018).

Brief History of Technical and Vocational Education in Nigeria
Technical and vocational subjects were first introduced in Nigeria during colonial period by the British. Some subjects offered then were wood and metal work, domestic science, agriculture (Armstrong, (2012). These subjects continued to be offered after Nigeria political independence. Therefore, in 1960, the General Trade Schools (GTS) which focused on vocational and technical education were put in place across Nigeria. These schools focused on wood working, metal and other in-demand vocations. Vocational and technical education were seen as avenue for employment opportunities and the vocational schools had a parallel academic institutions. Furthermore, in 1970's, many Nigerians were sent to European countries to learn or acquire technical skills in order to impart this information in their return to Nigerians. By 1977, in light of new national policy on technical and vocational education, it was realized that those sent to European to learn the practical skills failed to return to teach in Nigerian vocational schools.
In addition, in 1980s the Federal Government of Nigeria (FGN) rolled out technical and vocational education curriculum for both secondary and tertiary vocational and technical schools.

Concept of Technical and Vocational Education
Many scholars have written on the concepts and structure of technical and vocational education system. As a matter of fact, Dike (2016) stated that vocational education involves the training of students based on practical programmes generally targeted to a specific occupation, trade or vocation. Therefore, the aim for this practical programme is to improve the vocational skills of students in areas where they have talents and technical capability.
Technical education is design to build skills, abilities, understanding, attitude, work habits and appreciation as well as the knowledge and information needed for workers to progress in useful and productive employment opportunities (Salleh & Salaiman, 2015). The aim is to promote national technology development, socio-economic well-being and job opportunities creation through training and retraining as well as deployment of medium and high level manpower for national development.

Technical and vocational education is jointly defined by International Labour Organisation (ILO) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2018) as that which is:
"used as a comprehensive term referring to those aspects of the educational process involving, in addition to general education the study of technologies and study related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life."

Vocational Technical education plays a key role in facilitating community and national development. It promotes the acquisition of applied skills and basic scientific knowledge.

Vocational and technical education involves a planned programme course and learning experiences that begins with the examination of career options, supports basic academic standards, leadership preparation for industry and continuity education (Ozomena, 2013). In addition, vocational and technical education is a form of education whose primary aim is to improve and equip individuals for employment in different occupations relevant for national development (Oguejiofor & Ezeabasili, 2014).

Vocational technical education can be seen as an educational training which comprehends knowledge, skills, competencies, structural activities, capabilities, abilities and all other educational structural experiences acquired through formal, on the job or off- the job which is capable of improving recipient's job opportunities in various sectors of the economy as well as enabling the persons to be self-reliant capable of creating jobs (Ozomena S.A, 2013).

According to Cambridge Dictionary (2022), technical means relating to knowledge, machines or methods used in science and industry. Also, it relates to practical skills and methods that are used in a particular activity. Technical education provides trained manpower in applied sciences and technology, and it provides technical knowledge and vocational skills necessary for industrial, agricultural, commercial and economic development (Odu, 2017). Furthermore, technical education is a means of preparing individuals for effective participation in the world of labour force as well preparing responsible citizens as instruments for enhancing sustainable national development (Agbowuro, Oriade and Shuaibu; 2015).

Concept of Science Education

Science: According to Oxford Dictionary (2022) science is the intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through observation and experiment. Therefore, science education is the teaching and learning of science to school children, college students, or adults within the general public (Wikipedia, 2022).

In addition, science for Igboanugo and Egolum (2017), science is universally regarded as an organized study of natural phenomena. To Sulai and Kaluri (2018) science is defined as an intellectual activity carried out by human, designed to discover the ways in which this information can be organized to benefit race. In fact, a scientifically literate individual should possess a body of scientific knowledge, a set of scientific skills and behave scientifically by providing solutions to scientific problems. One of the significant objectives of science is to equip individuals with scientific knowledge and to develop manpower to meet up with the world advancement in science and technology.

Goals of Science Education

1. To develop students' understanding and experience of the scientific methods and to understand its values or benefits so that they will be able to apply the method. (Mohammed, 2017).
2. To be effective and skillful at practical work and skillful at practical scientific equipment.
3. To make people understand their natural world.
4. To provide students adequate evidence-based knowledge to be able to make informed personal judgment with the view to live healthy, safe, comfortable and environmentally sustainable life.
5. To understand and apply important scientific theories were necessary.

Concept of National Development

According to UNESCO (2022), National Development strategies are comprehensive focusing not only on economic development but also consider social, political and environmental dimensions in combination and ensure a synergy among the various policies and programmes

that contributes for the common strategy goals.

National development strategies (NDS), according to UNESCO include:

1. Promote equality and empowerment of women.
2. To develop global partnership for development.
3. To eradicate extreme poverty and hunger.
4. Achieve universal primary education.
5. Combat HIV/AIDs, malaria and other diseases
6. Ensure environmental sustainability

The Role of Science, Technical and Vocational Education for National Development

Science, technical and vocational education have been playing significant roles in human life. Therefore, man's ability to produce high quality goods and services have tremendously improved. In Nigeria, the most remarkable areas science, technical and vocational education have their impacts include:

a. Health: Considering the health sector, a lot of drugs and vaccines have been developed and these have done a great deal in increasing the life span of people. Many sophisticated tools or equipment have also been produced which are helping in the diagnosis and treatment of various diseases that would have claimed lives (Che-We Wang and Chin-Fang Chang, 2016).

b. Agriculture: Science and technology have created positive impact by improving food production. In fact, human sufferings have been reduced by in motivation and use of machines like tractors, harvesters, sprayers, ploughs. Today, agro-chemicals like pesticides, herbicides and so on are used to kill pests and unwanted plants or vegetation espectively for higher productivity (Mohamed Sikkander; 2022). In addition, high yielding varieties of plants and animals have greatly developed as well as disease prevention and resistant method. Furthermore, fertilizers have been developed to improving the yields of plants or crops by providing essential nutrients.

c. Information and Communication Technology (ICT): Science and technology have made tremendous impact on ICT development. Therefore, the world has now become a global village as a result of development in science, technology and vocational education. It is very easy to communicate with someone in another part of the world in matter of seconds using mobile phones. Moreover, people have access to information all over the world. Interestingly, ICT provides employment opportunities for the youths through the acquisition of the skills. Also, ICT provides information, entertainment and business life-changing opportunities through ICT. Information can be received through SMS, internet, email, twitter, whatsapp, facebook, etc (Ratheeswari K. 2018).

d. Industrial Productivity: Industrial productivity has been enhanced because of advances in science and technology which has immensely provided a sophisticated machines and equipment that are now being used for industrial production or manufacturing purposes.

e. Transportation: Science and technology education have improved our transportation system. Today, people can travel far and near using cars, aeroplanes, ships, etc. and this has tremendously reduced suffering in transportation sector of the economy (Kim and Schonfield, 2015).

f. Building: Shelter is one of the man's basic needs and this can easily to be achieved through science and technology for instance, through science and technology modern buildings that provide comfortable accommodation for people have evolved and architects or builders are embarking on scientific and technological research to showcase more sophisticated buildings for the world.

Challenges of Science and Technical Education in Nigeria

In Nigeria, there is a setback in the implementation of effective science, and education policies. Therefore, the government's present approach to education has failed to encourage innovation and efforts through research and development of ideas into problem-solving device for which science and technical education is known for. From the foregoing, some of the challenges of science and technical education include:

1. **Inadequate basic infrastructure:** Many public schools lack basic infrastructure and therefore not conducive for effective teaching and learning (Akighir, 2015).

2. **Inadequate Qualified Science Technology teachers:** In many public and private schools in Nigeria, there is shortage of qualified science and technology teachers. In most cases, they are poorly trained that is, they lack adequate professional development and they are not professionally qualified. As a matter of fact, they may have the knowledge of science and technology, but lack knowledge of effective method of teaching using modern instructional materials (Kola, 2012).

3. **Poor Attitude towards Science and Technology:** Many Nigerian students have negative attitude towards science and technology subjects and they believe that science subjects are very difficult especially mathematics, physics and chemistry. This wrong attitude has negative effects on science and technology in national development (Okere, 2022).

4. **Lack of Well-equipped Library for Research Work/Project:** Science and technical college teachers that are ready to carry out some research work/projects cannot do this successfully or effectively because the libraries lack up-to-date textbooks and periodicals in their area of specialization and interest (Omeluzor, Dolapo, Agbawe Onasote and Abayomi, 2017).

5. **Poor Implementation of National Educational Policies:** When policies are made and documented are fair and genuine, but the implementation often suffers delay and negative manipulations hence the objective and goals are eventually rarely not met. In Nigeria, problems associated with educational policy and planning includes negative political influence interference at directive at stage of planning, poor preparation and costing as well as poor evaluation of science and technical educational projects (Enyiazu F.A, 2022).

6. **Lack of basic Workshops/Equipment:** Many vocational and technical schools in Nigeria lack adequate workshops/equipment for training and re-training of people for practical skills.

CONCLUSION

The paper examined science and technical education as tools for national development. With the huge population of intelligent children and youths, Nigeria is a country of great promise and hope. Therefore, given the right environment and leadership quality as well as utilization of available resources. Nigeria could develop into a significant nation-state of prosperous, united, happy and glorious people, since the benevolent nature has provided the Nigeria with the human and material resources and conditions for national development. However, the challenges is that of educating pupils/students in responsible thoughts, skills and expertise as a starting point to serve as the essential tools to transform the poor economy. Therefore, effective science and technical education are the right tools needed to ensure the achievement of national development objectives.

RECOMMENDATIONS

On the basis of the focus of this paper the following recommendations are proffered:

1. The government of Nigeria should adequately implement science and technical education policies to achieve national development objectives.
2. Science and technical teachers should be trained in modern methods and techniques of teaching science and technology. Teachers should develop measurable, learning outcome and access them using a variety of methods.
3. The government of Nigeria should also ensure that every primary school has access to at least two specialists' subject teachers in both science and technology subjects.
4. School authorities at all levels of education should expose pupils/students to role models, such as professional scientists, technologist and engineers. This will encourage them to embrace scientific and technological ideas and knowledge.
5. Government through the Ministry of Education should provide adequate fund for the promotion of science and technical education at all levels of educational institutions in Nigeria. Also, effective supervision should be employed towards ensuring judicious use of the fund provided.
6. Both Federal and state governments should improve the sincerity and commitment in planning and governance on science, engineering, technology, and invention for national development.
7. We should strengthen the education, knowledge, and skill education, knowledge and skill building institutions to demonstrate high level of ability geared towards competing with the very best in the world of science and technology.

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