

# INNOVATION IN PHYSICS EDUCATION FOR EMPLOYMENT AND SELF PRODUCTIVITY IN NIGERIA

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## **Abstract**

Science has been proved to be an indispensable factor in the economic and human development of any country; and for Nigeria, it has a more critical role to play in terms of employment and self productivity. This paper examines the relevance of innovation in Physics education for employment and self productivity. The current situation and challenges facing science education, Physics inclusive is also highlighted to bring out the theoretical relevance for self productivity which actually has not been practically realized. Recommendations were made which include the need of government to invest heavily in education as recommended by UNICEF among others.

Physics is natural science that deals with the study of matter in relation to energy, as well as applicable concepts, like force. Physics is basically the study of how objects, the world itself and the entire universe behave. It has been very successful in revealing many of nature's profound secrets and plays key role in development of many disciplines such as chemistry, biology, medicine and engineering. It is therefore, pivotal to economic, intellectual, social and cultural development of every society, nation and the world at large.

The nation is rich in human and natural resources; it is still one of the poorest and under developed countries of the world with the recent statistical data standing at 69 percent in 2010, (National Bureau of Statistics (NBS) on Nigeria Poverty Profile Report 2010). The climax is that there are so many graduates of the nation's education system who are roaming about the streets as unemployed and job – seekers (Nwachukwu, 2009). This situation is contrary to the aims and objectives of Nigerian education stipulated in the National Policy on Education, (FRN 2004), which stresses the development of a self-reliant nation. Education which is the process of learning or acquiring knowledge is generally accepted to serve as basis for economic growth, social harmony and political stability. It is also accepted that the level of development of any society depends on its intellectual, scientific and technological achievement. Education is the only potent instrument for national development and industrial growth. Therefore, the quality of education; be it general, scientific or technological provided in any society and the nature of the change effected by the education affects the level of national development and industrial growth in the society.

## **Innovation**

Innovation, according to Oxford Dictionary, is the act of making change that is, to introduce new things, ideas, techniques etc. Abdulkadir (2007) defined innovation as a purposeful change from an established order that is progressive and beneficial in the area of policy, objectives, contents, materials and equipment, methods or evaluation strategies. Onwuka (1996) reviewed innovation from the point of curriculum revision as a series of planned and/or unplanned learning activities through the idea of adding or removing items in the curriculum, implying revision or renewal (that is modifying an existing learning process) with the hope of providing a better programme. The use of innovative methods in learning Physics is aimed at the purpose of training in non-traditional way, transforming the passive learning into an active, creative process. This allows rapid identification and compensation of gaps in the knowledge which in turn, leads to a rationalization and a more complete and lasting control of education content (Stinner, 2003).

## **Some Physics Innovations and their Impact on National Development**

The benefits and use of new ideas in development as advanced in research can be traced to the industrial revolution which is a name used to capture the spare of fundamental economic changes that

swept through Europe, beginning from Britain in the 18<sup>th</sup> and 19<sup>th</sup> centuries. It was ignited and sustained by a chain of innovations and inventions in direct productive activities. A short catalogue, advanced by Ibrahim (2003) shows innovations and inventions to include the following:

- Invention of the flying shuttle by John Kay (1704 – 1764)
- Invention of the spinning jenny by James Harhrees in 1764.
- Invention of the first mechanical loom and wool – combing machine by Edmum Carteright in 1785 and 1785 respectively.
- Invention of an improved spinning machine by Riched Arkwright in 1767.
- Application of steam power to spinning by James Watt in 1775.
- Discovery of Iron – smelting with coke by Abraham Darby in 1709.
- Revolutionizing of the iron industry between 1740 – 1800 by Henry Cort and development of railways and machine tools in 1920 among others, all related to machines and mechanical energy in Physics.

Since then, the impact of education in terms of innovation have traversed every conceivable sphere of life as the ability of man to produce high quality goods and service have tremendously increased, productivity of all factors of production have increase. In Nigeria, the quest for economic revitalization continues, and it has led the present administration to approve a new Science Technology and Innovation policy by the Ministry of Science and Technology, (Ita, 2012). The history of developed countries around the world has confirmed that Science, Technology and Innovation (STI) remain the platform that drives the potential within these sectors through research and development programmes (R&D).

It is also by the use of telephones, computers, internet and space craft's in communication/ transportation system that is the order of the day. Internet which is a more recent technology innovation provides available services.

### **Self Productivity as it Relates to Education**

One of the main objectives of National Policy on Education (NPE) is the “Acquisition of appropriate skills for self-reliant nation”. Self reliance/productivity is an expression which has become conceptually and practically attractive, particularly in developing countries, wrestling with the economic forces of meeting numerous needs with limited resources (Jimo, 2009). Achieving this aim of acquisition of the appropriate skills by learners by delivering Physics education and/or Science and Technology education practically in such a way will enable individuals acquire the necessary and vital skills for self employment.

At this point, it is very clear that alleviating poverty and resuscitating self-reliance which is a prelude to self sufficiency and employment generation could be achieved in Nigeria when innovative Physics education and more of Science and Technology Education in general are taught as hands-on and mind-on practical activities in public schools.

### **Problems/Challenges facing Innovation in Physics Education**

The first training programme of Technology Education in Nigeria was in the 1940s, but many are the factors that are militating against innovation in education in the developing and underdeveloped nations. Among several problems responsible for the country's poor technological development as enumerated by Abdullahi (1997), are the following:

- **Lack of Technological Awareness**

Majority of the Nigerian population still remain in the darkness of illiteracy. Even among the educated, the percentage with the awareness of technology is very small. School curricula at the primary and secondary level do not get the opportunity to develop inquisitiveness and ingenuity in the children. Moreover, such schools and children homes have mechanical contrivances to play with and become curious about how they work (the technology).

- **Inconsistencies and Poor Implementation of Policies in Science and Technology**

The Ministry of Science and Technology was established in 1979. It was later merged with the Ministry of Education in 1984 only to be resuscitated as a ministry in 1985. The number of Research Institutions in the ministry also kept changing with years. These changes have negative effects on the ministry and its ability to coordinate Science and Technology. The creation of six (6) Universities of Technology was followed by their reduction in number and non implementation of the 60:40 ratio policy in admission to universities in favour of Science and Technology.

It is at the first quarter of 2012 that approval was given for the new policy of Science, Technology and Innovation (STI) by the government as announced by the Hon. Minister of Science and Technology, which will give more opportunity in Science Technology and Innovation in Nigeria.

- **Poor Training Facilities**

Although some states like Kano, Katsina etc. have established Science and Technical Secondary Schools, the schools are poorly equipped. The country's tertiary institutions too lack equipment and other facilities. Moreover, they have large student population which do not allow for effective teaching.

- **Poor Funding and Management of Research and Development (R & D)**

Nigeria has not been adequately funding institutions and universities to have any meaningful impact on Research and Development. The private sector has not paid much attention to research and development either. Moreover, inventors in the country have not been encouraged by either government or private enterprises. While some research institutes operate under the Federal Ministry of Science and Technology. There is no simple, effective and organized body in charge of Research and Development for the country. However, the efforts of the National Agriculture Research and Development Project (NARDP) and the Raw Materials Research and Development Council (RMRDC) are appreciated.

- **Failure to Complete Major Industrial Complexes**

Nigeria conceived a wonderful idea of establishing major industrial complexes on which other industries would develop. Thus Iron and Steel and the petrochemical complexes were started in 1988, respectively. These complexes were to produce raw materials required by large number of industries like the Peugeot Automobile Nigeria Limited. Unfortunately, both complexes are yet to be completed two decades after commissioning them.

## **Conclusion**

Innovation in teaching and learning of Physics education will be brighter if majority of the citizens are technologically educated from the grass root (pre-primary, primary and post primary). Provision of more and recent training facilities with adequate trained staff is a necessity and institution should be adequately funded to manage the development of the teaching/learning activities. Always Science and Technology policies have to be consistent and fully implemented. It now shows that a well-planned science and technology education would play a great role in the development of vital skilled individuals that will enable them to be self employed, self-productive, which will assist in tackling the ugly massive unemployment situation in the country.

## **Recommendations**

Based on the discussion so far, the following recommendations are made:

- There is the need to upgrade the educational background of individuals to incorporate the emergence of new body of knowledge by giving proper training to the science teachers, providing them with adequate knowledge on the subject content, various methods of creative skills and practical approaches of teaching/learning Physics Education. This will yield effective and efficient Physics Education capable of producing individuals that are ready for employment and self productivity.
- There is growing interdependence of new technologies leading to the need for broad-based cross educational disciplines and training for all occupations. This implies that children and

- young individuals should be given proper value and attitudinal orientation by all stake holders to encourage them to be versatile since white collar jobs are no longer plenty where available.
- A continual upgrading of the responsibilities of lower level of professional manpower that are facing much expected levels of competence. This could be achieved when serving Physics teachers are retrained, through in-service, workshops, seminars, conferences and study tours. This will enable them have reasonable knowledge capable of producing individuals with enough self reliant skills.
  - Adequate funding and necessary teaching/learning facilitated better understanding of the subject contents, provision of functional facilities/equipment should be made available in all institutions of learning by the government, and should reflect to the directives of UNICEF guidelines.
  - Provision and installation of Information Communication and Technology (ICT) facilities with adequate alternative energy source for constant power supply and a well planned maintenance/sustenance foresight, to facilitate access to required information for quality education by the relevant authorities.

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