

# **PHYSICS EDUCATION IN NIGERIA: PROBLEMS AND PROSPECTS IN TEACHER EDUCATION**

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## **Abstract**

*Physics education is fraught with a host of challenges which have resulted in abysmal students performance at all levels of education, over the years, with attendant production of half-baked graduates by Nigerian Universities. This paper examined the numerous prospects of physics education to man and the society; Goals of teacher education as enshrined in the National Policy on Education (FRN, 2004). The paper also spotlighted a number of daunting challenges that fraught physics education and teacher education in general. It advocates a repositioning of basic elements of physics education in-line with the realities of the 21st Century.*

According to Omatseye (2000), “the school is a social institution established by members of the society for the purpose of transmitting their culture from one generation to another”. It improves the culture by producing generations of people who are more refined and enlightened than their parents or forefathers. Naturally, the teacher and the education system in which he (the teacher) operates cannot stand aloof from the society. They are part and parcel of it and are both an embodiment and a reflection of culture, traditions, yearnings and aspirations of the people. This fact though irrefutable at a global level, will at the national level, raise a couple of crucial issues, encapsulated in the question; what are the purpose (goals) of education in the Nigerian social context?

Currently, physics is being taught at secondary and tertiary levels of our education system primarily by lecture method together with laboratory exercises aimed at verifying concepts taught in the lectures. Unfortunately, owing to the abstract and

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counterintuitive nature of many of the elementary concepts in physics, the lecture method often fails to help students overcome the many misconceptions about the physical world that they have developed before undertaking formal instruction in the subject.

According to Abullahi obsolete (1978) children have innate curiosity about objects and events that surround them. Student often ask for explanations about such natural forces as lightening, thunderstorm and most times erroneously believe that heavy objects should fall faster than light objects and when two objects with different masses collide, the force on the less massive object is larger than the force on the more massive object. Whereas Newton's 3rd Law says that the forces exerted by the more massive object on the less massive one is equal in magnitude to the force exerted by the less massive object on then more massive one. Well articulated programme of study aimed at developing a pedagogical technique and strategies that will help students learn physics more effectively will clear these misconceptions and satisfy the curiosities.

Physics is the bedrock of science, and according to Ishaya and Ahmed (1998), education and science are fundamental to development and as a result, any nation lacking in these areas will continue to wallow in poverty.

Furthermore, Guobadia (1987) stated that we cannot increase the production of Engineers in isolation of physics and mathematics. In the light of the above, no amount of energy, time, money, or resources spent to ignite interest in the subject and improve its teaching and learning should be considered a waste.

### **The Concept of Education**

Education simply means that act of imparting knowledge to mankind. What is knowledge? To philosophers, among them in the mainstream are Francis Bacon and Socrates who were both English and Ancient Greek philosophers, "knowledge is power and virtue". The lessons adduced from the assertions of these two great philosophers are that knowledge is a treasure source. It opens wellsprings of unfathomable insights into the world and how to improve it as well transcend its barriers and stereotypes. Knowledge liberates one from the shackles of ignorance and unveils immense vistas of possibilities. Knowledge opens one's horizons and broadens one's worldview. It enables one to see one's reality in a balanced perspective sets clear and realistic as well as controls history.

As earlier stated, the process of acquiring knowledge is described as education. It is this process that has enabled humanity to develop, to raise critical questions, to subdue nature, master it, invent new things, transmit values and sustain civilization. Education takes place in formal and informal settings as well as applies various methodologies that lead to national development.

Turning to the National Policy on Education for answer to the questions raised in the first paragraph, the Federal Republic of Nigeria (1981, 1989, 1998 and 2004) stipulated the following major national educational goals.

1. The training of the mind in the understanding of the world around.
2. The acquisition of appropriate skill and the development of mental, physical and social abilities and competences as equipment for the individual to live and continue in the development of the society.
3. The inculcation of the right type of values and attitudes for the survival of the individual and the Nigerian society.

To achieve the national goals “Government shall establish efficient inspectorate services at federal, state and local government levels for monitoring and maintaining minimum standards at all levels of education below the tertiary level” (FRN, 1982 and 2004). Unfortunately (Udofat, 2006).

*There are shouts of falling standards of education not only in Akwa Ibom State but in school nationwide. The school products are no longer making a living in the society in which they live. Also, the quality of education the children receives in school does not endow them with the means to lead more satisfying life and enjoy the humanistic aspect of education as an end in itself. Employers of labour, parents and indeed the general Nigeria public now tend to wonder whether the schooling system in which they have made huge investments is still making dividend. They tend to wonder whether the system has lost its focus.*

### **Goals of Teacher Education**

This apprehension presupposes the existence of a number of daunting challenges that bedeviled our formal education system vis-à-vis physics education, calling for repositioning of basic elements, in line with the demands of the 21st Century. To address any imperfection in formal education, we must first identify the goals of teacher education. This is why; No education system may rise above the quality of teacher education (FRN, 2004).

*A good teacher education programme has its goals (FRN, 2004 page) the:*

1. Production of highly motivated, conscientious and efficient classroom teacher for all levels of our education system.
2. Encouragement of further spirit of enquiry and creativity in teachers.
3. Helping of teachers their commitment to national goals
4. Provision of teachers with the intellectual and professional background adequate for their assignment and makes them adaptable to changing situations.
5. Enhancement of teachers’ commitment to the teaching profession.

These goals, as stipulated by the Federal Republic of Nigeria (FRN, 2004), is to provide a focus teacher education programmes. Therefore, the apprehension from the general public as to whether the school has lost its focus is predicated on the deep conviction that the school is not realizing its goals.

### **Prospects of Physics Education to Man and Society**

There are numerous and good prospects of physics education. Physics is inevitable an instrument to social growth; and as a result, its teaching, learning and development should be of interest to us. The effect of science, physics in particular can be felt in all areas of human activities- the clinical thermometers, x-rays, motor cars, bicycles, cameras, radio sets television and electricity are a few of the many inventions and discoveries of man which requires the knowledge of physics. Furthermore, many natural phenomena or some events that happen in nature like eclipse; rain, thunderstorms lightening, echo etc. find explanation in physics principles.

Physics is basic to all sciences. Biology, Chemistry, Astronomy, Geology and all branches of engineering must have thorough background of physics. Physics is more conscientious than all other sciences because it lays claim to the whole universe as it subject matter, whereas the biologists are restricted to living organisms, chemists' to atoms and molecules, psychologist to man and his fellow creature etc.

The practical importance of physics is manifested by the fact that no matter how mysterious or complex a system may be, its behaviour is ultimately is detected by the laws of physics.

Specifically speaking, the importance of physics to man and society can be seen in these areas;

1. **As a source of income:** Physics ,provides raw materials from the natural substances like extraction of a minerals for the production of finished goods ready to be consumed by man and which is conducive to man's environment. Those who engaged in the extractive industry of filled are by this means provided with a source of income which ordinarily would not have been possible without physics.
2. **As a source of health:** Physics finds out elements which are used in producing drugs, pills, injections to prevent or cure diseases and prolong human life. Others include provision of machines, microscope, Operating or Surgical equipments, blood transfusion, production of Lenses for the correction of eye problem for vision etc. and of course, the production of test-tube babies are all health-related discoveries made possible by knowledge of physics.

3. **As a source of Recreation and Entertainment:** Musical instruments, transistors, radios, tape recorders, Video, Television, Cameras, the Cinema sport activities are achievement of physics.
4. **Source of communication:** Miller and Culpepper (1964) stated that it is difficult to conceive to life in any country without the present communication network. Distribution of information from one place to another or exchanging words with people in different places using telephones, computers etc are all by means of physics. It is used by individual, by businesses, by governments, and by the armed forces.
5. **Source of protection and Security:** Discovery of bombs, bullets, guns and explosives that can be used for security purposes and all fire extinguishers, switches, sockets for controlling explosions and fire damages are all made with help of physics.
6. **Sources of electricity and development:** Miller and Culpepper (1964) suggested that physics provides light which is the source of everyday development. Production of electric iron, electric stoves or cookers, cell (Batteries), generators, transformer, switches and electronics like air conditioners, refrigerators that help to make life comfortable to man are all made by physicist.
7. **Source of mechanization:** Physics provides machines which make working easy for man. In the area of agriculture, machines like tractors, ploughs and others which make work easy for farmers of nowadays are from physics. The storage facilities apparatus for pest and disease control, canning and bottling processes for protecting the crop products and making them safe for human consumption are all done with the help of physicists. The good variety of crops and their yields of plants has been greatly increased by the researchers made by physicist on what the soil contains and the kind of nutrients required by plants to ensure greater harvest. Other machines like fan, engines and other industrial machines are produced with the knowledge of physics.
8. **Source of interpreting natural phenomena:** Phenomena can be interpreted with the knowledge of physics like eclipse, rainfall, echoes, wave etc. it helps man in avoiding superstitious beliefs and also use them in producing other important products like loud speakers (Microphone used in auditorium, churches and other public places).

9. **Source of employment:** with the knowledge of physics, both skilled and unskilled person can be employed or secure job in many industries or factories as a teacher, lecturer, engineer, constructor, surveyor, electricians etc.
10. **Source of transportation:** Engineers use the knowledge acquired in physics to utilize coal tar and metals for the construction of roads and bridges, ships, land vehicles, trains, aeroplanes and other things which carry people and their luggage's as well as goods or products from one place to another.

### **Challenges of Physics Education in Nigeria**

A number of factors hinder the teaching and learning of physics which by extension hinder technological advancement and national development. Some of them are:

- a) **Lack of Physics Teaching Facilities:** To have a sound understanding of acts and principles presented by physic teachers, students must be made to experience physics phenomenal directly through practical work. It therefore, becomes imperative that laboratories should be well equipped for more effective teaching and learning to take place in the schools. Bajah (1975) corroborated this assertion by saying that if the classrooms and laboratories are devoid of apparatus and equipment, teaching would be reduced to cheating and we would have crisis in our hands.

Regrettably, the situation in our schools depicts the statement above. Practical work is not done in some of the JS classes and SS 1 classes due to lack of laboratory and laboratory equipment. This situation according to Ezeachogu (1985), leads to a situation where our final year students in secondary schools enter examination hall without knowing exact names of some simple physics apparatus let alone knowing how to use or manipulate them.

- b) **Insufficient Qualified Physics Teachers:** The number of qualified physics teachers in our schools is grossly inadequate. This is the observations of Adesina (1986), Kalu (1991) and Udeinya (1994). This has led to the situation where people without teaching qualification or graduates of other sciences like Biology, Chemistry are made to teach physics. This scenario no doubt, does not encourage functional and qualitative physics education in our country.
- c) **Unqualified Labouratory Attendant:** Similar to insufficient qualified physics teachers is the presence of, or the use of unqualified labouratory attendants in our schools. Lab attendant should be rooted and grounded in the subject for them to able to really assist. Unfortunately what we have in our school system these days are situations where the attendants are mere messengers lacking even the most

elementary knowledge of the few facilities in the laboratory. This no doubt is a strong impediment to physics education.

- d) **Attitude and Phobia by Students:** Attitude has been described as a person's enduring favourable or unfavourable cognitive evaluations, emotional feelings and action tendencies toward some object or idea (Krech et al (1962). Many students develop fear for mathematics and Physics abinitio. They perceive them as difficult and their leads to their negative attitude towards the subject.

### **Conclusion**

It is the nation's aspirations to achieve technological advancement. Physics education in a veritable vehicle to realize this dream in view of its position in science and technology.

Knowledge of physics has led to a lot of discoveries and inventions that have made life enjoyable the world over. Unfortunately, most of such discoveries are not from us here. However, it is gratifying to note that the man that produced the first made in Nigeria Car Engr. Dr. Ezekiel Izuogu is a physicist. Therefore, for us to produce our own whiz kids and inventors, functional and qualitative physics education is the answer and the time to do it is now.

### **The Way Forward towards Functional Physics Education and Teacher Education in Nigeria**

The hidden message conveyed in the acknowledgement that physics education is fraught with a host of challenges which have resulted in abysmal students performance at all levels of education, over the the years, with attendant production of half-baked graduate by Nigerian Universities centre on the need to refocus (revamp, restrategies, recreate and stabilize) the practice and delivery of education in Nigeria for sustainable development. Based on the analysis of the situation, the following strategies are advocated for teacher education in general, and physics education in particular.

1. The educational authorities/government should play their role well by making adequate provision of teaching and learning materials for physics such as equipping the various laboratories so as to enhance true practical works.
2. The school authorities should as a matter of necessity, employ only those that are well groomed in physics as labouratory attendants so that they can be of help to both the students, teachers and of course the society at large.
3. Our educational institutions need to be adequately equipped and the working condition of our teachers, technologists, technicians and telecommunications engineers made attractive (Ezeigbo, 2000). This will go a long way in tacking the

problem of brain drain in our universities, polytechnics, secondary schools and research institutions.

4. To achieve adequate transfer of learning between the science classroom and outside world as a way of building desired attitude in students, examples within the immediate reach or environment of the children should be chosen. This is the right way to stimulate and maintain a favourable attitude and interest of students.

Furthermore, it is imperative that teachers, parents, and of course the large society should be involved in molding the child towards cultivating favourable/positive attitude toward physics taking cognizance of its importance to the achievement of the much desired technological advancement.

5. Kalu (1991), observed that the number of physics and mathematics teachers in secondary school level are grossly inadequate. To solve this problem of insufficient number of physics teachers, more of them should be recruited and posted to our secondary schools to make sure that at least two physics teachers are present for each class. This will help reduce the work load of those already in the system and ultimately increase their productivity.
6. Parents should also be involved in their children's career choice by providing useful guide and enabling environment for their wards academic success.
7. The quality of the existing teaching force must be improved primarily through extensive in-service training programme, incentive package being built into the programme.
8. Better quality of teachers must be ensured through pre-service education of teachers by careful selection and training, effective induction, professional encouragement and adequate remuneration.
9. Admission of candidates into physics education programme should be based on merit and interest, oral/written examination and interviews.
10. Government should ensure that unqualified teachers who are already in the teaching field are sponsored to obtain the required qualification for proper functioning of teaching-learning process.
11. Lecturers need to switch from the prevalence of lecture, the predominant method of instruction in the traditional classroom setting, to inquiry-based, constructivist method (such as the guided discovery method), including online teaching, learning and research.



12. Government should provide ICT training programme for teacher educators with incentive package. Unless teacher educators model effective use of technology, it will be impossible to produce a new generation of teachers to effectively delay the new tool in the classroom. Thus, unless teacher education programme is redesigned to incorporate, in real terms, modern technologies of teaching/learning, our education system stands the risk of churning out learners who are neither critical thinkers nor problems solvers, including those who cannot meet the challenge of rapidly technological society of the 21st century.

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