

## FUNCTIONAL PHYSICS EDUCATION AS A MEANS OF NATIONAL TRANSFORMATION

BY

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**Abstract**

*Education is universally acknowledged to benefit individuals and promote National Development. Quality education is fundamental to National Transformation because it depends on literate and skilled citizenry. It is pertinent to note that among the many challenges of National Transformation, education remains the key agent for the desired transformation. This paper discussed physics as crucial for any nation that wants to maintain its lead among the community of nations and as tools for National Transformation. The Nation as well as the education sector is faced with challenges, ranging from conflicts, strikes, instability, corruption, lack of motivation for teaching personnel and inadequate funding among others. Quality and functional physics Education is an education that is effective, efficient, and sustainable and can provide knowledge and skills which produce values and attitude that offers the basis for transforming conflict itself. This paper concluded that the success of any education is hinged on proper planning, efficient administration, and policy stability, motivation of staff and adequate funding of the educational system. Physics is an essential part of the educational system and of advanced society. The paper further recommended that there is absolute need for Governments at all levels to be committed to the implementation of educational policies especially physics education, for without physics, the technological culture of the citizens cannot be firmly rooted. Collaboration among the Federal, States, Local Governments and relevant educational bodies should also be strengthened.*

**Keywords:** *Functional, National transformation, Physics education*

**Introduction**

The basic principle of education in Nigeria is the equipping of every citizen with such knowledge, skills, attitudes, and values as to enable him/her to derive maximum benefits from his/her membership in a society, lead a fulfilling life and contribute to the development and welfare of the society (Castle, 2007). Education is universally acknowledged to benefit individuals and promote National Development. Education therefore is an agent of change and transformation. Nigeria today is in the process of national reconstruction and functional physics education is the bed rock of national reconstruction (Assisi, 2012).

National Transformation refers to a change from one situation to a better one, a total departure from the old order to a new one. It is deliberate and requires action. It can take place when people's values undergo orientation in terms of their beliefs. It is pertinent to note that among the many challenges of National Transformation, Education remains the key agent" for the desired transformation (Chitty, 2009). Education plays a significant role in ensuring peace. Education that gives hope and possibilities for the future through an improved quality of life is essential to building and maintaining peace. Also the provision of such will entail fewer opportunities and motivations to engage in conflict hence a transformed nation (Barnett, 2006).

Transformation is the process of becoming ready and willing to expand one's view on what is possible for oneself, one's organization and one's society. It is the process of engaging in a programme of profound growth, of developing a deep commitment to taking effective and urgent actions to realize one's vision and dreams (Assisi, 2012). In order to achieve the laudable national transformation, a functional science and physics education in particular must be put in place. This is because functional physics education would produce advanced scientific technological and cultural humanistic knowledge on the basis of which Nigeria would be transformed into a timely human society that satisfies adequately the material, moral, social and cultural means of her people (Bunting, 2009).

The study of physics is crucial for any nation that wants to maintain its leads among the community of nations. In fact, the technological potentials of any nation could be more accurately gauged by the quality of its physics education, for without physics, the technological culture of her citizens cannot be firmly rooted (Ogunleye, 2010). The role of physics education in the modern world, is more important than in any other time in history (Delamonica, 2004).

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

A careful analysis and appraisal of Physics education in Nigeria reveals some fundamental problems and challenges. These are discussed briefly below.

**(1). Curriculum Content:** The Physics curriculum content being used in Nigerian secondary school presently is at par to cope with the challenges of 21st century strive towards technological development. However, despite the introduction and continuous use of the Physics curriculum in the schools many years ago, Nigeria still lacks the technology that could satisfy her daily needs and comfort (Ajayi, 2009). Perhaps, that was why (Alonge 2009) remarked that the content of science taught in the school is void of local environment and do not identify with the technological needs of the society. The curriculum does not take into consideration the cultural values and beliefs of the society for which it was designed. The curriculum and instructions in African schools still reflect the colonial orientation which is devoid of African values and environmental factors. It is only recently that efforts are being geared towards reforming the curriculum to suit the needs of the society for which it is meant to serve (Ajayi, 2009), but the curriculum still lacks the values and materials that connects it to the immediate environment.

**(2). Teaching Methods:** The teacher's methods of teaching may go a long way in enhancing effective learning by the students. The traditional method of teaching science (Physics inclusive) in the schools involves "chalk and talk" activities which is fully teacher-centred. In this case, the students are passive "robots" in the classrooms who regards the teacher as the repertoire of knowledge. There is agitation to inculcate the 21st century approaches to science teaching in Nigeria. These include inquiry method, collaborative teaching, discovery method etc. They are purely child-centred approaches. However, Nwagbo (2005) noted that science teachers shy away from activity-oriented instructional methods that are more effective and stick to inadequate traditional methods of teaching. The practical activities that could enhance creative thinking in the learners are given "lip-service" in Nigerian schools (Ajayi, 2009).

**(3). Teacher's Quality:** The teacher is the facilitator who is to impact into the students' concepts expected to be learnt. Research studies (Olaewaju, 2006) revealed that most teachers teaching Physics are ignorant of the curriculum content of the subject. The students taught by these rather incompetent teachers would be invariably shallow in Physics concepts and principles. This agrees with the submission of Ogbazi (2007) that one of the problems of industrial development in Nigeria is that of inadequacy of sufficiently trained human resources. This has been a major constraint to the rate of technological and economic development in Nigeria. The need for professional teachers in science has been on stage in Nigeria for some decades ago. The situation in most secondary schools in Nigeria is that Physics is taught by graduates in other fields of science such as B.Sc. Physics, Engineering; B. Tech Technology; HND etc. This set of people lacks the skills involved in teaching science since they were not trained on the job. Fajonyomi (2007) argued that the success or failure of any educational programme rests mainly on the adequate availability of well-qualified (professional) and dedicated teachers. The result of a study by Adedayo (2010) showed that professional teachers affect the students' performance in Physics positively more than the unprofessional teachers. Thus, the realisation of the national growth in technology as highlighted in the National Policy on Education hinges largely on the quality of the physics teachers.

**(4). Negative Attitudes of Students towards Physics:** To the majority of the students in the secondary schools in Nigeria, Physics is perceived as a very difficult subject (Soyibo, 2005). The impression cuts across the gender. Most parents do not help the situation in that through their comments and reactions, they frighten or scare their children and wards away from Physics. Ajayi (2009) noted that students generally classified the three core science subjects—Biology, Chemistry and Physics—into level of difficulty. He reported that Biology is considered the easiest, followed by Chemistry and Physics being the most difficult subject. The cause of the negative perception of students towards Physics was identified

by Adedayo (2008) to include the fear of the mathematical skills involved, harsh teacher-students' relationship, students' unreadiness to study, preconceived bad information that Physics is a difficult subject and poor method of teaching. This impression greatly affects students' readiness and interest to the study of Physics. The consequence of this is felt on the expected technological growth of the country.

**(5). Students' Ignorance of the Relationship between Physics and the Environment:** It is rather unbelievable to remark, based on interview with some senior secondary school Physics students, that most students offering Physics lack the knowledge of the importance and relevance of Physics with their environment and human development. They do not see the subject as a means of solving practical social problems but rather just the acquisition of abstract concepts that have no bearing with the Physical situation. This is in support of Olarewaju (2006) who reported that "students felt that science curriculum is too rigid and irrelevant to their experiences in Nigeria". Students still do not see the correlate that exists between Physics and courses that are practically based in resolving life issues. Failure of the students to relate Physics to relevant societal problems make them to study the subject without objectivity or interest. Many take Physics perhaps because of peer influence or suggestions by elderly person. Thus, they see the so-called rigorous tasks involved in its study as a mere waste of time and too abstract to study.

**(6). Teaching Materials:** The importance of instructional materials in the teaching-learning process cannot be over emphasised. Certainly no effective Physics teaching can exist without learning materials, equipment and practical activities. It is therefore relevant that Physics laboratories must be adequately stocked with the necessary facilities for effective teaching and learning of the subject. However, educational researchers reported that most secondary schools in Nigeria have no Physics laboratory and few that have it are rather ill-equipped (Ajayi, 2009). Ajayi (2009) while assessing the level of students' involvement in practical activities in Physics laboratories concluded that only 23.23% of the schools did allow their students to carry out practical activities. The practical activities on various aspects of Physics are inadequately performed in the schools. One would expect the teacher, who is the facilitator in the teaching-learning process, to improvise for materials where they are not available or are insufficient. But the attitudes of the teachers towards improvisation of teaching materials is negative. Many of the teachers are not aware of the improvisation method in teaching (Njoku 2008). Those that are aware of the use of local equipment and materials in teaching are hindered by a number of factors such as laziness on their part, lack of funds, time constraints, etc.

### **Functional Physics Education as a means for National Transformation**

Physics is one of the core science subjects taught at the senior secondary school level of the Nigerian educational system. Physics teacher education curricula which were developed in line with the criteria established by the NUC are meant to produce competent Physics teachers (Ogbazi, 2007). The knowledge of Physics is usually required to pursue courses like Astronomy, Geology, Chemistry, Biology, Engineering amongst others. Assisi (2012) established that learning of Physics offers the student an opportunity to think critically, reason analytically and acquire the spirit of enquiry. This is why he asserted that: Physics is crucial for effective living in the modern age of science and technology and to transform the society. Despite the importance of this subject, it is widely recognized that the teaching and learning of Physics has been fraught with challenges such as low enrolment both in secondary schools and in tertiary institutions in Nigeria (Alonge, 2009). Notable among the causes for low enrolment of students offering Physics in schools include: poor Science and Mathematics background of students at the junior secondary level of education, poorly equipped Physics laboratories, inadequate motivation of teachers, poor remuneration, inappropriate teaching strategies employed by the teachers and insufficient number of qualified Physics teachers (Adedayo, 2008).

Literature has shown evidences of functional Physics education of transforming Physics education programme in Nigerian educational institutions to the teaching of senior secondary Physics (Omosewo, 2008). Philosophy in curriculum development serves as a means of national transformation in the implementation of the curriculum. Physics education fosters the worth and development of the individual,

and the general development of the society. Therefore, the curriculum under this situation most especially Physics as subject in Nigeria secondary school must be taught by competent graduate teachers undergone training under a unified philosophy meet the needs of the society in order for physics education to function and to transform the society. Physics is the study of matter (science of energy and their interactions). It plays a key role in the future of the progress of mankind. The support of physics education and research in the National transformation is important because of the following:-

1. Physics is an exciting intellectual adventure that inspires young people and expands the frontiers of knowledge about nature.
2. Physics generates fundamental knowledge needed for the future technological advances that will continue drive the economic engines of the world.
3. Physics contributes to the technological infrastructure and provides trained personnel needed to take advantage of scientific advances and discoveries.
4. Physics is an important element in the education of chemists, engineers and computer scientists, as well as practitioners of other physical and biomedical science.
5. Physics extends and enhances one's understanding of other disciplines, such as the earth, agricultural, chemical, biological and environmental sciences, plus astrophysics and cosmology- subjects of substantial importance to all peoples of the world.
6. Physics improves the quality of life by providing the basic understanding necessary for developing new instrumentation and techniques for medical applications, such as computer tomography, magnetic resonance imaging, positron emission tomography, ultrasonic imaging and laser surgery (Gates, 2002; Hawes, 2008 & Trisma, 2010)

### Conclusion

The World Bank, (1999), points out that the success of any education is hinged on proper planning, efficient administration, and policy stability, motivation of staff and adequate funding of the educational system. Physics is an essential part of the educational system and of advanced society.

### Recommendations

Based on the conclusion, the following recommendations are stated:

1. There is absolute need for Governments at all levels to be committed to the implementation of educational policies especially physics education, for without physics, the technological culture of the citizens cannot be firmly rooted.
2. There should be collaboration among the Federal, States, Local Governments and relevant educational bodies to be strengthened.
3. There should be the need for all governments and stakeholders to improve physics teaching at all levels of the education system.
4. There is the need for Scholarship and fellowships for Undergraduates and Postgraduate students studying physics.
5. Adequate funding for national laboratories and the formation of new ones is appropriate.

### References

- Adedayo, J. O. (2008). Effects of electronics artisan's background and competence in science and technology advancement in Nigeria. *Research in Curriculum Studies*. 5(1). 132—136.
- Ajayi, P. O. (2009). Evaluation of instructional materials for the implementation of senior secondary school Physics curriculum in Nigeria. *Nigerian Journal of Counseling and Applied Psychology*. 4(1). 100—110.
- Alonge E I (2009). The relevance of traditional Mathematics for relevant science education in Africa. *Journal of Science Teacher Association of Nigeria (STAN)*. 21(1). 24—44.
- Assisi, A. (2012). *NEITI Implementation and the Federal Government of Nigeria's Transformation Agenda*. A Paper Presented at the NEITI Forum Abuja.

- Barnett, W.S. (2006). Research on the Benefits of Pre-school education: Securing high returns from pre-school for all children. *New York National Institute for Education Jan 10*.
- Bunting, E. (2009). Rationalization, Quality and Efficiency. *South African Journal of Higher Education* 7 (2): 17-27
- Castle, E. B. (2007). *Education for Self- help: New strategies for developing countries*. London. Oxford University Press.
- Chitty, C. (2009). *Understanding Schools and Schooling*. London. Routledge Falmer.
- Delamonica, E.V. (2004). *Education for all*. How much will it cost? Development and changes, 35 (1): 3-30
- Fajonyomi, A. A. (2007). Reviving higher education relevance in Nigeria. A paper presented at the 3rd Faculty week and annual national conference; Faculty of Education, University of Maiduguri, Nigeria. 26th—27th
- Gates, S. (2002). *Empirically Assessing the Causes of War*. Paper presented at the 43rd Annual Convention of the International Studies Association. New Orleans, 24-27
- Hawes, S. (2008). *Questions of Quality Education*. Primary Education and Development. Harlow: Longman
- Njoku, Z. C. (2008). *Training science, technology and Mathematics teachers for improvisation: Educators as facilitator*. 41st Annual Conference Proceedings of STAN. 42—44.
- Nwagbo C (2005). *Effect of guided inquiry and expository teaching methods on the achievement in an attitude to Biology of students of different scientific literacy*. Online at <http://www.pepreal.cl/FIE/pdf/lopbc/nwagbo.pdf>
- Ogbazi, J. N. (2007). Using co-operative education students' performances. *Vocational Education Journal*, 1(1). 162—169.
- Ogunleye A.O. (2010). *Girls perception of strategies for improving low enrolment, underachievement and attitudes of girls in physics at the senior secondary school level*. 42<sup>nd</sup> Annual conference proceedings of science teachers association of Nigeria (STAN). Heinemann Education Books (Nigeria) Plc. Pp 344 – 351.
- Olarewaju A O (2006). *Census of students' under-achievement*. 27th Annual Conference Proceedings of the STAN. 80—87.
- Omosewo K A (2008). An investigation into the acquisition of scientific attitude among junior secondary school students. *Journal of National Association of Women in Academic*. 1(1). 82 89.
- Soyibo S K (2005). A critical review of some of the causes of students' poor performance in science. *Journal of Science Teacher's Association of Nigeria (STAN)*. 27th annual conference. 80—87.
- Trisma, E.A. (2010). Physics education as a tool for revitalizing Nigeria economy in the 21st Century, *Journal of science, State college Oju, Benue State* 5(1).
- World Bank (1999). *Nigerian Human Development Report, Lagos: UNDP World Data on Education, (2010) Nigeria*. 7<sup>th</sup> Edition.