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TRANSFORMATION OF TEACHER EDUCATION IN THE 21ST CENTURY: A CASE OF PHYSICS TEACHER QUALITY FOR NATIONAL DEVELOPMENT

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ABSTRACT

Transformation of teacher education in any Nation is achievable if education is given its rightful place in the scheme of things. Transformation of teacher education in Nigeria can be realised if the teachers are equipped with the needed knowledge, attitude, behaviours and skills with good policies and well designed procedures. No system of education can rise above the quality of its teachers. Therefore, this paper looked at the present physics education curriculum, physics education graduates in Nigeria and the way forward in developing physics teacher quality by repositioning physics Teacher education programmes for the 21st century. Among the recommendations was that B.Sc physics education should be reviewed to increase the capacity of the physics education graduates.

KEY WORDS: Transformation, Teacher, Physics

INTRODUCTION

To bring radical change (transformation) in teacher education in the 21st century globally is a herculean task that requires determination and adequate teacher preparation. Teacher education refers to the policies and procedures designed to impact prospective teachers with the knowledge, attitudes, behaviour and skills that they require to perform their tasks effectively in the class room, school and in their community. Teacher Education is a tool for national transformation since it is the teachers who produce members of the teaching profession and the quality human resources for national economy. The current state of Nigerian nation and the present standing of education graduates can only be squarely addressed if teacher preparation strategies are given the seriousness it deserves.

The Federal Government of Nigeria under President Goodluck Ebere Jonathan is currently pursuing “Transformation Agenda” in all the sectors of the national economy but nothing seems to be working. Though Nigeria is in the 4th position in terms of oil wealth worldwide; 70% of Nigerians live on less than \$1 per day; Nigeria is considered as one of the poorest countries of the world; about nine million primary aged children are currently not in school (Nwabudike, 2011). Many youths have no access to quality education and many who went to school are unemployed. Insecurity, kidnapping, robbery, unsteady power supply, lack of infrastructure, and discipline and corruption have helped to cripple the economy.

The questions one may ask include:

- a) What serious plan and practical orientation are we putting in place to achieve first and foremost vision 20:2020?
- b) How will Nigeria achieve the change needed in teacher education when our educational institutions are constantly interrupted with warning strikes or total strike?

Transformation of teacher education is achievable in Nigeria if we can critically reflect on the current state of the Nigerian nation and then analyze the trust of teacher education provision capable of bringing the desired change. In fact, no system of education can rise above the quality of its teachers. It is the teachers who produce the members of the teaching profession and other professions. Physics Teachers Education is an integral part of the teacher education and physics as a subject is regarded as the most fundamental of the natural sciences. Today, physics is taught in Nigeria in order to expose students to knowledge mastery for the purposes of passing examination without adequate skill acquisition that will make the graduates employable. For a realistic change, Physics teacher education should be driven with good policies and curriculum implementation through adequate training, induction, entrepreneurship and Continuing Professional Development (CPD) or Teacher Development. To translate teacher education visa – vise, Physics teacher education in the 21st century, all aspects of physics education must be revisited.

PRESENT PHYSICS EDUCATION CURRICULUM

The current failure of students in physics (Idore, 2011) at the West Africa School Certificate Examination (WASSCE) and National Examination Council (NECO) suggests that teachers do not know how to impact learning experiences to the learners. Similarly the rate of Physics graduate unemployment (Idialu and Okereke 2010) calls to question the quality of Physics education graduate from tertiary institution in Nigeria. The educational system has not been able to produce Physics teachers who should possess the skills and ability to manipulate the resources of the land to generate wealth for economic growth and development. The inability of Physics Teachers to produce those who can exploit our Natural resources for development is an indicator that the curriculum is not adequately implemented. How can one implement the curriculum when it is overloaded and the school time table overcrowded? All that the teachers do is to rush the syllabus and get students certificated. Whether the products of the curriculum have the skills for competence is not their concern. More questions that one needs to ask are:

Is Physics curriculum knowledge based?

Does it prepare students for global competitive world?

Is the curriculum theory oriented?

Is acquisition of entrepreneurial workforce skills stressed?

Can the graduates function effectively in the fast changing scientific and technologically globalized world?

Of course if the curriculum is functional, the graduates of Physics education will not be among the unemployed.

Nigeria as a Nation has great potentials and Nigerians are ready for change. The way forward is quality education. Quality education broadens people's outlook; it contributes maximally to economic, political, scientific and technological growth of any nation. If the teacher education is transformed, the nation in turn will be transformed. It is not a surprise that the National Policy on Education (FRN, 2004) stated that, no educational system can rise above the quality of the teacher. Competent qualified professional Teachers (quality teachers) is an indices of transformation. Therefore, the Physics education curriculum should be restructured and its implementation properly monitored to ensure quality physics teachers production since the quality of civil servants, politicians, Medical doctors, Lawyers, Professionals in other sectors depends generally on the quality of the teachers.

PHYSICS EDUCATION GRADUATES IN NIGERIA TODAY

A recent national survey by Okebukola (2012) on teacher quality revealed the following weakness in the education graduates in Nigeria. They include:

Shallow or poor knowledge of subject matter;
Inadequate exposure to teaching practices;
Poor classroom management and control;
Poor computer literacy skills;
Inability to communicate effectively in English;
Lack of professionalism;
Lack of self-reliance and entrepreneurial skills; and
Poor attitude to work.

According to Obama's (2009) declaration, America's future depends on its teachers. I see this statement to mean the quality of teachers. Hence Nigeria as a nation must strive to achieve transformation of her teacher education. If good preparation strategies are put in place to address the above shortcomings, quality physics teachers can emerge to remedy the present standard of education graduates in the country.

DEVELOPING PHYSICS TEACHER QUALITY FOR THE 21ST CENTURY

Transformation of teacher education in the 21st century requires general overhaul of the teacher education and Physics teacher education in particular if the desired physics teacher quality can be achieved. Quality teachers come from quality curriculum and quality professional development. A quality physics teacher is a globally competitive worker with saleable knowledge and skills for gainful employment by government or to be self employed. The era of teaching for knowledge mastering just to passing examination without adequate skills acquisition is obsolete (Makwuegbe, 2012). A shift from one-way to two-way process of communication between the teacher/lecturer and learner/student involving three channels of communications: information, behaviour and feedback should be explored. Physics being the most fundamental of the natural sciences should be able to expose perspective teachers to excellent, analytical, quantitative and problem solving skills so that no physics education students remains unemployed after graduation. The teacher of the 21st century needs knowledge, professional skills and personal qualities (www.unicef.org/teacherteacher.html). The use of creative and inspirational method of teaching is paramount for this century (www.school-teacher-students-motivationresources-courses.comgoodteachers.html). This view points to the use of modern teaching strategies like concept making, constructivist approach, scaffolding, process based teaching and learning. The use of materials in our environment to produce materials similar to the imported ones brings learning closer to the learner. Training given to physics education students in education institutions should be improved by giving quality supervision to the teaching practice.

Staff exchange programmes with foreign Universities to ensure conformity with international standards and development should be encouraged with teacher education institutions, collaboration research between teacher institutions should also be encouraged.

To ensure transformation of teacher education visa-vise, Physics teacher education and enhance physics teacher quality, the following areas among others were discussed in this paper.

Physics education curriculum for the 21st century

Functional physics teacher preparation programme

Information and Communication Technology

The essence of Entrepreneurial education

Repositioning Physics teacher education programme

- a. Admission process
- b. Qualities of candidates admitted for physics education programme
- c. Qualities of educators and support staff
- d. Finance and funding
- e. Motivation, monitoring and evaluation

RECOMMENDATION

Physics Education Curriculum fort the 21st Century

The present Physics education curriculum needs to be restructured to meet the requirement of the 21st century. The curriculum should make students active participants, practical oriented, self-reliant and self-employed. According to Okobia (2010) and Omuegbele (2011), the Teacher science curricula in Nigeria should be redesigned to enable students graduate in scientific career options. Physics students should graduate in maintenance services, production of simple machines, Energy production, solar panels, Transistors, optical fibers, optical mirrors and lenses, microscopes and simple telescopes, Thermometers, Hydrometer, Capacitors, Resistors, Meter Rule, Transformers e.t.c. It then means that more emphasis should be geared towards practical processes in these areas in the curriculum. The teaching and learning in physics education programmes should equip students with entrepreneurial skills so as to make them more relevant in the 21st century.

Functional Physics Teacher Preparation Programmes

The 21st century requires more than a single organ or commission coordinating the activities of the teacher education at any given level. One of the ways to enhance the quality of Physics teacher in Nigeria is by ensuring that the National University Commission (NUC), National Commission of Colleges of Education (NCCE) and the National Business and Technical Education Board (NABTEB) Jointly organize workshops to which the department of curriculum, Assessment, Teacher preparation, ICT, private sector industries and businesses, parents and community groups, professional organization and unions, NGOs, Donors, Universal Basic Education Council(UBEC) and the National Educational Research and Development Council (NERDC)

are invited to brainstorm and identify areas of growth and development in the national economy – manufacturing, Construction, Technology, engineering e.t.c. These should be developed and incorporated into the existing courses and taught to Physics education students in teacher preparation institution in the country who on graduation will teach same to their students in the primary and secondary schools. Indeed one of the indicators of quality Education in any nation is the proportion of the country's graduates who are employed in various fields (Gbenedio, 2011).

Information and Communication Technology (ICT)

The world is changing globally from industrial society to information and communication technology (ICT). It is ICT that has transformed the world into a global village. Therefore transformation of the teacher education in the 21st century would require ICT skills for the teachers own development, for administrative purposes, for their daily use in the classroom settings. ICT should become as important component of teacher professional development curricula so as to create opportunities for them to participate in the global knowledge based economy. Today the nation of Estonia ties teacher promotion to ICT skills while Chile, England, and France, among other nations, now link ICT competencies to teacher licensing requirements. (Silvernail, 2009). Nigeria must not be left out of implementing this trend, therefore, the teachers/lecturers implementing the physics education curriculum should be able to use ICT to impart knowledge. In this respect, all physics students and physics lecturers in teacher preparation institution should have their own laptops provided by government; and computer training should be a mandatory course for student's teachers. Therefore, physics education curriculum should focus on creativity, innovation, research, acquisition of ICT skills and production of new wave of entrepreneurs.

The Essence of Entrepreneurial Education

Being employed as a physics education graduate is good but being an employee only is not good enough. Furthermore, one cannot create wealth as an employee only. Thus, entrepreneurship offers a stronger base for wealth creation and for solving unemployment and poverty problem. Implementing teacher education inclusive of entrepreneurial education will be a major innovation for the transformation. The longitudinal study by Izedonmi (2011:121), summarized 100 employees aged 20 -25years who worked for 40years when many of them had retired at the age of 65years as follows: 54% of them ended up broke and depending on people for livelihood; 30% died before the retirement age of 65years; 10% were looking for livelihood through contracts; 5% were comfortable to eat well; only 1% was rich in the sense of it. This finding gives a picture of education without provision for entrepreneurship.

Izedonmi (2011) seems to have informed the decision of the Federal Government of Nigeria to the effect that all Universities, polytechnics and colleges of Education in the country were mandated to run entrepreneurial education with effect from 2007/2008 session. One may want to know the number of institutions that has complied to this directives. Out of 73 Federal and State Universities, 63 Federal and States Colleges of Education and 59 Federal and State Polytechnics, only three Universities, two Colleges of Education and three polytechnics have entrepreneurial education in their programmes. Okebuola (2012) has queried the inability of most institution to comply with the directive. In fact, the relevance of this provision to physics teacher education, being the fundamental natural science cannot be over emphasized. Entrepreneurial education certainly:

- Will equip physics teacher with the capacity needed to produce goods, render services and add to the country's Gross Domestic Product (GDP) with a significant index of a country's economic standing;
- Has the potential for lowering poverty level and raising living standard of physics education graduates and Nigerians by promoting self employment and self reliance, thereby raising the family income;
- Provide for job creation which will lower crime rate ("419", cyber crime 'yahoo – yahoo' business, kidnapping, human trafficking) as young men and women will be gainfully employed.
- Will help to keep unemployed young graduates economically sustained, even in old age
- Improve the relevance and public responsibility of our educational institutions, as overtime physics education graduates will be out of gainful employment.
- Develops the small and medium scale enterprises (SME) sector. In USA, SMS sector provides 84%, Federal and state government providing 6%, big corporations providing 8% of the total employment in the country. Nigeria as a nation can reach this level in the 21st century if entrepreneurial education is properly implemented in her teacher education programmes.

Repositioning Physics Teacher Education

To guarantee the best from Physics teacher preparation programmes in Nigeria, the following guidelines should be considered so as to improve on the quality of the physics teacher graduates

ADMISSION PROCESS

The students admitted into Physics education programme should have the aptitude, attitude and interest in physics education (Nwanbudike, 2010). Low intellectual ability who will find physics academic tasks difficult should not be admitted into the programme. Like other professional courses, physics education programme should be increased to 5years. That is, 5years B.A/B.Sc. Education. This is to enable the students embark on six months internship in teaching practice and six months entrepreneurial training. The teaching practice and entrepreneurial training should be structured for effective supervision and monitoring. Any student that fails the teaching practice and the entrepreneurial training should not be registered with the Teachers Registration Council of Nigeria (TRCN)

Quality of Candidates Admitted for the Physics Education Programme

The University admission Policy gave entry requirement for the following courses to be the same: Medicine, Pharmacy, Sciences, Engineering and Education. But individual Universities have different cut off points with higher cut off points for other courses except Education Courses (Nwanbudike, 2011). This means that, brilliant students opt for other courses leaving education courses with less cut off point. Therefore, less intelligent students find their way into Education courses at the Universities or Colleges of Education. The point being stressed here is that those that enter into physics education are those who cannot cope with other courses or those who could not gain admission into those so called “superior courses”. Consequently, the trained physics teachers are of lower quality without interest, positive attitude and disposition expected of a quality physics teacher (Idialu and Okereke, 2009).

The admission process and the quality of candidates admitted for physics education programme and teacher education generally in Nigeria should be improved upon to reflect the 21st century teacher education. To ensure enhanced quality of teachers (Physics teachers) education graduates, high selection criteria should be applied:

5 credits at a sitting in WAEC or NECO Senior School Certificate Examination.

(6 credits at two sittings should be abolished)

Reliable written examination and interview should be introduced.

The same cut off point should be applicable for all the courses irrespective of the University so that admission into education courses will no longer be a matter of shopping exercises.

Quality of Academic Personnel and Support Staff

The academic personnel and the support staff in most educational institutions lack commitment in the discharge of their duty (Omuegbele, 2010). Poor remuneration makes it difficult to retain top quality academic personnel needed to produce quality physics graduate teachers.

Consequently, incompetent physics teachers who cannot impart meaningful knowledge to students or gainfully employed are all over. Many of those in the class room setting:

- cannot prepare good lesson plan
- are unable to manage the class room
- have no good knowledge of the subject matter
- cannot employ good teaching methods
- have ineffective use of the language
- cannot improvise materials
- cannot match theory with practice (Omuegbele, 2010)

Finance and Funding

The quality and quantity of Physics teachers/graduates depend largely on the financial resources available to the educational institutions (the producers). Underfunding has in no small measure contributed to the decline in the quality of physics graduates because most of our educational institutions lack well equipped laboratories, facilities, equipment and other relevant tools (Okoba, 2010). Therefore, the students are not adequately exposed to skills and competences needed to teach the subject or to be self employed. The problem expressed here is that, the funding of educational institutions in Nigeria is not commensurate with the level of expansion in the educational sector. To cope with the demand of teacher education in the 21st century in Nigeria, the budgetary allocation of 26% or above in the National Annual Budget should be released to education sector as recommended by UNESCO. This calls for increased funding to cater for the provision of in service training, especially on ICT to serving teachers, equipping physics education laboratories with materials and facilities, infrastructural facilities that can boost the quality of the teachers.

Motivation, Monitoring and Evaluation

In order to realistically cause a change in teacher education in the 21st century, the physics education teachers/lecturers and the prospective teachers must be lifted up. Their condition of service has a great impact on the productivity. So, adequate remuneration is needed to make them give quality service. Institution based management committee as recommended by Omebe's (2010) should be applied to monitor and evaluate the physics curriculum implementation, staff development, instructional facilities, learning environment, teaching and learning, research and government intervention. The report of this committee is vital to the productive and responsible products that can compete with other nations and demonstrate high quality competence. Omebe (2010) research finding of regular monitoring, motivation and evaluation should be utilized to enhance quality teaching.

CONCLUSION

Transformation of Teacher Education (Physics Teacher Education) is achievable in Nigeria in the 21st century if teacher preparation programme is focused on the acquisition of cross domain 21st century skills such as creativity, critical thinking, problem solving, collaboration, entrepreneurial education and ICT literacy. Quality teacher are products of well implemented quality curriculum and quality professional development. The present Physics Education Curriculum if restructured, it will make physics education students active participants, practical oriented, self reliant and self – employed. In addition, overhauling, the admission process, quality of the academic personnel, funding, motivation of academic personnel, supervision and other preparation and teaching strategies will bring about the desired reformed teacher education for national development in the 21st century.

RECOMMENDATION

The following recommendations if implemented will assist to bring about the needed change in the teacher education in Nigeria and subsequently lead to the production of competent quality physics graduates in the 21st century.

- The teacher education (physics teacher education) curriculum should be reviewed jointly by all the organs or commissions co-ordinating teacher education activities at all levels. All stake holders, interest groups and professional bodies should be invited to the review workshops.
- To key into the growing global economy, teacher preparation programmes should focus on the acquisition of the cross domain “21st century skills, such as creativity, critical thinking, problem solving, ICT literacy and collaboration.
- High selection criteria of 5 credits at a sitting in WAEC or NECO Senior School Certificate Examination should be introduced and used for selection of education candidates for admission in all education institutions across the country. (6 credits at two sittings should be abolished).
- Teacher Education institutions should give quality supervision to teaching practice through regular and effective monitoring and evaluation.
- Staff exchange programmes with foreign Universities should be enforced to ensure conformity with international standards and academic staff development.
- Teacher Education should be well funded. The Federal and State Governments should release the 26% budgetary allocation as recommended by UNESCO to educational sector from their annual budgets.

- To retain and boost the morale of physics education personnel, adequate remuneration should be provided by the government (Federal and State)
- ICT training should be made compulsory for all physics education teachers/personnel; both serving and those on training. Recruitment of teachers should be tied to ICT skills and competence.
- Education Institutions should be provided with well equipped workshops or multipurpose science workshops where production of materials can be made for commercial gain.
- B.Sc Physics Education Programmes in all Education Institutions should be increased to five years like other professional courses and only quality candidates should be admitted for the programme
- Physics Education related factories like Cable Manufacturing Companies, Electrical Appliance Companies, Scientific and Laboratory Equipment Companies e.t.c. should fund researches and partner with Education Institutions in the training of students.
- The use of locally available resources and improvised materials in teaching of physics education students should be emphasized and encouraged.
- Researches by physics education students and lecturers should be funded by the various levels of government and NGOs to tackle the problems in teaching and learning at the education institutions
- Two-way process of communication between the teachers/lecturers and students/learners involving three channels of communications: information, behaviour and feedback should be used in teacher education programmes.
- Teachers' Registration Council of Nigeria (TRCN) should be the only body to register and determine the eligibility of teachers in education institution and the TRCN should review teachers licenses every five years with written examination and interview
- Teacher education should be inclusive of entrepreneurial education to provide for wealth creation and solve unemployment and poverty problem for physics education graduates in Nigeria.

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