

RELEVANCE OF QUALITY BIOLOGY TEACHER EDUCATION TO NIGERIA ECONOMIC GROWTH AND DEVELOPMENT

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Abstract

The reliance of quality teacher education has brought about so much campaign in the teaching learning profession and this has brought about proper monitoring to meet up standards for the nations economic growth. the content and purpose of this paper seeks to address the relevance of the seven pointy agenda with particular emphasis on the education sector vis-a vis development of human capital and research to provide materials and products needed to meet the agenda's requirements. In furtherance of this research, the quality and quantity of biology teachers and its relevance to vision 20:2020 was further identified to include production of highly motivated and efficient classroom teachers for the education system and to encourage further the spirit of enquiring and creativity in teachers and so on and some points drawn out in terms of how the biology teachers can help in the nation economic development vis-a-vis adapting an inter disciplinary approach in other to cope with new issues in biology and the need to provide practical experiences in biological investigations and some recommendations made vis-à-vis ability to solve everyday problems relating to adequate funding of education for the provision and upgrading necessary institutions of learning and urging government to invest heavily in education for Nigeria economic growth and development.

Introduction

Educating people in science and technology has been widely acknowledged as a sure way of promoting economic development, eliminating poverty and introducing social welfare. Investment in science and technology education has many years been a priority to most countries of the world. (Nwagbo, 2005) Developing countries such as Nigeria, Ghana etc have made concerted efforts to generalize the provision of science education to both secondary and primary schools. For science teachers to confidently and effectively discharge their duties, they must be guided by certain standards or rules for operation, which will give them a pride of place in their chosen careers (Nwagbo, 2005). The present teaching and learning in science classroom in Nigeria seem inadequate. The level of science teacher competence needs to be raised to the level that will allow teachers to teach students using varied instructional aids with a focus on understanding rather than lecture, transmitting textbook knowledge with the consequent student rote-learning and simple recall knowledge (Ameh, 1991).

All teacher education programmes aim at developing good teaching skills, teacher education should equip teachers to communicate effectively. Teachers should be taught by the same methods which they will be expected to use in teaching children, that is, they should acquire some skills with a degree of independence. What makes a good teacher really depends upon objectives of the teaching, the context, the age of the students and what the teacher perceives to be needed by the students. All the above factors could combine to make a good teacher but what supersedes all is the degree of combination linked to a respect for the students as an individual (Ameh, 1991). In line with, the President Musa Yar'adua declared that he met a nation with vital infrastructure such as roads, power, water supply, etc in comatose state while key sectors such as agriculture, manufacturing, education and transportation were floundering. It was against this background that in August 1, 2007, the President unveiled a Seven-point agenda which he hopes would set the socio-economic state on track. The agenda is to serve as the platform from which his administration on would spring off to transform Nigeria into one of the twenty largest economies of the world by the year 2020. He enumerated the seven point agenda as

1. Power and Energy
2. Food, Security and Agriculture
3. Wealth Creation and Employment

4. Mass Transportation
 5. Land Reforms
 6. Security
 7. Qualitative and Functional Education
- Details of the agenda exactly as published by government are presented below to serve as a reference in the challenges they pose to education.
1. Power and Energy: The infrastructural reforms in this critical sector through the development of sufficient and adequate power supply will be to ensure Nigeria's ability to develop as a modern economy and an industrial nation by the year 2015.
 2. Food Security: This reform is primarily agrarian based. The emphasis on the development of modern technology, research, financial infusion into research production and development of agricultural inputs will revolutionize the agricultural sector leading to 5-10 fold increase in yield and production. This will result in massive domestic and commercial outputs and technological knowledge transfer to farmers.
 3. Wealth Creation: By complex reliance on revenue from non-renewable oil resource, Nigeria has yet to develop industrially. This reform is focused on wealth creation through diversified production especially in the agricultural and mineral and solid mineral sector. This requires Nigerians to choose to work, as hard work by all is required to achieve this reform.
 4. Transport Sector: The transportation sector in Nigeria with its poor roads network is an inefficient means of mass transit of people and goods. With a goal of a modernized industrialized Nigeria, it is mandatory that Nigeria develops its transport sector. The government has already started this process by the ongoing rehabilitation and modernization of the railway. While the reforms might take some time to effect, it is a need that must be addressed.
 5. Land Reforms: While hundreds of billions of dollars have been lost through unused government owned land asset, changes in the land laws and the emergence of land reforms will optimize Nigeria's growth through the release of lands for commercialized farming and other large scale business by the private sector. The final result will ensure improvements and boosts to the production and wealth creation initiatives.
 6. Security: An unfriendly security climate precludes both external and internal investment into nation. Thus, security will be seen as not only a constitutional requirement, but also as a necessary infrastructure for development of a modern Nigeria economy. With its particular needs, the Niger Delta Security issue will be the primary focus, marshaled not with physical policing or military security, but through honest and accurate dialogue between the people and the Federal Government.
 7. Education: The two fold reforms in the educational sector will ensure firstly the minimum acceptable international standards of education for all. With that achieved, a strategic educational development plan will ensure excellence in both the tutoring and learning of skills in science and technology by students who will be seen as the future innovators and industrialists of Nigeria. This reform will be achieved through massive infusion of money into the Education sector. This 7-point agenda represents the vision of the present administration which is to strengthen the reforms already started and re-build the Nigerian economy to become one of the twenty largest economies by the year 2020. (Okeke 2008)

Implications of the Seven Point Agenda for the Education Sector

According to Okeke, 2008 the analysis of the intent and content of each of the seven point agenda reveal lots of implications for education;

- (i) Development of human capital: Does Nigeria have enough human resources to drive the seven point agenda? Whether it be power and energy, food security, wealth creation, health or indeed personnel to implement the agenda. The required personnel include scientists, technologists, technicians, engineers, metallurgists, economists, medical practitioners, agriculturists, accountants, legal personnel who possess the expertise to actualize the agenda. It is in none other than the education sector that such personnel can be produced. It is logical therefore to assert that any agenda that does not put education sector first and adequately fund

it to produce required human resources cannot guarantee the success of any development agenda.

- (ii) Research to provide materials and products needed to meet the agenda requirements: Achievement of the goals of the seven point agenda depends heavily on what and how science and technology in solving the problems of food security, poverty, power, energy, security, environmental degradation and underdevelopment can never be over emphasized. Many questions are begging for answers in those areas covered in the 7-point agenda – Energy, Power, Agriculture, Food security, Wealth creation, Transportation and Education sectors can only be provided through research. Research Institutes will require massive injection of personnel and funds to facilitate research into the various sectors of the economy. The Institutes are part and parcel of the education sector. They work in collaboration with other arms in the education sector such as Universities and Polytechnics. Collaborative researches seeking better ways to actualize the goals of the agenda must be encouraged and financially sustained. Here the PTDF and the private sector have major roles to play in financing researches for national development.
- (iii) Enlightenment of the Public/Stakeholders: Education ‘is the instrument for any sustainable development. In addition to producing experts, education at its most fundamental level serves as the key to the production of literate citizenry who are able to understand their role in the socio-economic and political development of the nation. The UN Chronicle of June/August 2003:3, rightly asserted that “education is the instrument for any sustainable development; it also has the power to transform the individual and the world for better”. It is the education sector that has the capacity to package and organize suitable mass education programmes on government’s agenda that are capable of penetrating different social strata, reaching the grassroot populace. Such advocacy and mobilization procedures include public seminars/conferences, meetings, rallies, school children’s menu. There are many Nigerians who have not even heard or who do not know what the seven point agenda is all about; they just hear the slogans on the radio and television. The success of that agenda depends heavily on education of the public so that by becoming aware of their responsibilities and expectations from the agenda, they can easily key into the vision. The sum total is that quality biology teacher education is at the center of successful implementation of the 7-point agenda. The driver of any education is the teacher hence science teacher education programme is critical to nation economic development and growth.

Vision 20:2020 and the Seven Point Agenda

It is expedient to appreciate from the on-set that vision 20:2020 is the dream or development aspiration, and the 7-point Agenda is the road map or the planning imperatives. (Tahir, 2008). For 2009, the President proposed that “new projects must be well articulated, properly costed and sensibly prioritized taking into account available resources and the implementation capacity of the ministries, departments and agencies”. Thus 91% of the capital vote would be spent on Agenda, namely: education, food security, national security, power/energy, land reform, job creation and the Niger Delta. As for the recurrent vote, a number of cost-saving measures would be introduced in view of the declining oil prices occasioned by global recession. We should expect to see a well-controlled but fairly robust infusion of investment funds into our sector to deal with issues of improved infrastructure. We should also expect a greatly reduced expenditure in general administration and services. If and when this happens, a welcome reversal would have taken place in expenditure pattern in favour of development, for the first in a very long time. Furthermore the vision does not see government as the only agent in delivering on these promises. Rather government intends to engage the private sector to serve as co-implementor of the Agenda. (Tahir .G. 2008). It is fair to assume that Vision 20:2020 is relying on the education sector to be a key driver in realizing its targets, especially those that have to do with human capital development just as the sector is also relying on the vision’s new moments to reposition, re-strategize and renew itself so as to face the challenges that might be imposed by the new dispensation. The realization of the Vision’s targets cannot be possible without a sound science education. However, achieving sound science education cannot be possible without

the teacher. Teachers are a critical factor in quantitative education delivery. For Vision 20:2020 to achieve its goals, science teacher preparation must be pursued assiduously. To be one of 20 largest economies in the world Nigeria requires a critical mass of people who are literate and skilled to play a significant role in its transformation. Herein lies the imperative of teacher education in the transformation process.

As was alluded to earlier, the Vision and its Agenda promise to inject new funds into the education sector with a view to improving the quality of its infrastructure and enhance its services. Thus we are more likely to witness large scale capital works in form of refurbishing renovation and re-equipped of academic and academic support facilities with cutting edge technologies and teacher renewal. Above all the private sector is likely to become an active player in a variety of educational provisions and or services. The implications of these expectations for science teacher education are many. However, the following challenges are taken into consideration:

- i) Production of correct mix of quality teachers for basic and post-basic education within the period of eleven years.
- ii) Embarking on an aggressive continuing teacher professional development to up-grade their knowledge, fine-tune their competencies; strengthen their commitment with view to enhancing their performance in the classroom, school and the community.
- iii) Modernize quality assurance mechanisms by making them robust and all-inclusive in view of multiplicity of institutional types and their providers. (Tahir, 2007)

Quality and Quantity of Biology Teachers for Vision 20:2020

Like all other large scale national transformation, the successful execution of the education-specific 7-point Agenda item, lies chiefly on the extent to which the teacher factor is taken into consideration. Teachers are generally referred to as mediators of educational innovations. It is for this reason that the teacher is being globally recognized as the most prominent and significant factor that impact on the learning process, especially in the school context. It is equally recognized that competent and dynamic teaching personnel would ultimately produce efficient and effective human resources for national consumption. What all this goes to show is that whatever resources that are deployed to improve education may not bring the desired result unless the teacher factor is adequately addressed. (Ukeje, 1996). Our concern here is the capacity of the system to produce the required quantity of quality teachers for vision 20:2020; through the pre-service framework. Presently there are well over 140 colleges, university faculties and institutes of education in Nigeria, with roughly 600,000 students offering regular courses leading to the award of Nigeria Certificate in Education, baccalaureat, and master and doctorate degrees in education. The overall annual output of these institutions is roughly 50,000 – 60,000 students.

The major criticism of this teacher education model is that the production system is out-moded. The content is said to be abstract and its technology archaic. Consequently the output cannot meet the demand of the society, whether qualitatively or quantitatively. The fact that the best brains in the secondary schools usually opt to study courses other than education at the tertiary level is something of great concern to the education industry. So long as Colleges of education and university faculties of education continue to exist in the school system. This capacity gap is a clear indication that the ability of the production system to satisfy the demands of vision 20:2020 will be impaired. Are there solutions in sight? Of course there are the usual palliatives such as introduction of series of incentives to attract and retain good teachers, improving teacher condition of service in addition to making the curriculum more attractive and pleasurable to walk-through etc. We have been saying these year-in and year-out without any significant shift in positive direction. What else do we need to do in order to attract youngsters to enroll in education courses at the tertiary level? The role of education as a tool for economic, social and political transformation as envisioned by our leaders through vision 20:2020 and its 7 point agenda underscores the need for Biology teachers, as it key operators to be part of the changing trend in development. Consequently teachers must be subjected to constant training and re-training if they are to effectively and appropriately perform their roles as agent in the new Nigeria of our dream.

Relevance of Biology to Vision 20:2020

Biology is a basic human science that has always evoked the interest of learners at any level. Its study involves the understanding of the composition, functioning and survival of living things including human beings and other non-living things and their interaction in nature. Though its scope is wide, its relevance to human existence, health and survival, makes it study interesting and valued. The child studying biology starts with life which is familiar and relevant aspects of nature. This enhances his understanding of nature and intellectual development, his problem solving skills development, acquisition of survival values and skills relevant to human existences. The teacher studying Biology is placed in a good position to cultivate similar traits in his learner. The study of biology curriculum exposes the teacher trainee to the understanding of the aims, objectives, scope and application of contents (the various biology topics and concepts) methodologies, laboratory/practical and field techniques of studying, teaching and applying biology as a subject or course of study to life. Like all other science courses, the study of biology exposes the subject relevance, relationships and application to the learners, the society and for economic development (Ango, 1991).

Teacher education is falling between the many tools of the 6-3-3-4 policy of education. As can be seen 6-3-3-4 is referring to primary, junior secondary and senior secondary and university education. I do not believe this is done to spite teachers, but only because the assumption implicit in the entire policy is that teachers are there and will always be available. In section 9 paragraph 57 of the national policy, (NPE 2006) the following statement was made: "Teacher education will continue to be given a major emphasis on all our educational planning, because no educational system can rise above the quality of its teachers". In furtherance of the positive statement, the document listed five purposes which constitute the basis of our quality biology teacher education. These are:

- a. to produce highly motivated, conscientious and efficient classroom teachers for all levels of our education system.
- b. To encourage further the spirit of enquiry and creativity in teachers;
- c. To help teachers to fit into the social life of the community and society at large and to enhance their commitment to national objectives.
- d. To provide teachers with the intellectual and professional background adequate for their assignment and to make them adaptable to any changing situation not only in the life of the country but in the wider world;
- e. To enhance teachers commitment to the teaching profession.

In all these laudable statements, the teacher emerges as the most important catalyst in the realization of the goals of education for vision 20:2020 (Baikie, 2002).

Good (1959) in relating professionalisation to quality of teaching states that the teacher is concerned with the promotion of the vocation of teaching so that it may increasingly become functional and that this will involve:

- (i) Distinctive expertness and high competence resulting from theoretical study and knowledge,
- (ii) Practical mastery of pedagogical techniques.

This implies that for quality biology teacher education to meet the need of the country, the following must be put in place:

- (i) Specialized competence, skills, attitudes and recognition that characterize the profession in general.
- (ii) The extent of preparation, experience and success in teaching.
- (iii) The rank or recognition a biology teacher has achieved in the profession.

This being the case, the aim of a biology teacher should be to continually improve the quality of biology teaching and learning for the students and the country's standard of education for vision 20:2020 (Nwagbo, 2005).

The National Science Teachers Association (NSTA) in their position statement on science teacher professionalism and quality recognized the teacher as the key to making science teaching a profession. Consequent on this NSTA set up standards of what quality science teaching and professional practices are, they include:

- (1) Knowledge of and participation in the activities of professional community.
- (2) Ethical behaviour consistent with the best interest of students and the community.

- (3) Willingness to work with students and new colleagues as they enter the profession.

In the context of quality biology teacher education, quality can only be achieved if the biology teacher identifies quality practices to guide them and ensures that every biology teacher goes for remedial training.

- (I) The biology teacher has to go beyond the mediocritical knowledge and move on to biology education that is transformative and that deals with the issue of society.
- (II). His/her teaching must meet the needs of the society and he/she must be committed to exemplary practices.
- (III). He/she must stay abreast of latest research in practice, reexamine his/her teaching regularly, experiment with new approaches and share his/her experiences with other colleagues.
- (IV). The biology teacher should develop a caring attitude for his/her students. Greater care should be taken to understand student differences and developmental stages, so as to address a diversity of learning styles.
- (V). The quality biology teacher should have a commitment, to practice beyond the level of one's own needs. This calls for trust and collegiality and teachers and colleagues.
- (VI). Effort should be made towards collaborative work so as to encourage interpersonal professional activities; research seminars, conferences etc should challenge the biology teacher to self-development. (Ango, 1991)

Expected roles of biology teachers in promoting quality science education is that the prospective and practicing teacher have major roles to play in the development of knowledge, skills, competences and reform document (National Policy on education, subject curriculum etc). The objectives of science teaching specified in the curriculum are hardly achieved because:

- I. of lack of opportunity of the child to have direct experiences with learning materials.
- II. Inappropriate learning environment for science teaching.
- III. Use of inappropriate teaching methods, others include:
- IV. Large class size, rigid school timetable, overloaded curriculum and lack of incentive for the teacher.

However, due to knowledge explosion and the need for the country to move with other countries of this world, the issue of quality biology teacher education has become important and necessary for improving the country's economy and growth toward vision 20:2020.

1. To prepare the majority of science teachers towards this new trend requires awareness and proper coordination of existing knowledge to fit into the new scheme of things.
2. Biology as the science subject most favoured by students need teachers who are well grounded not only in knowledge of subject matter, but also in the skills/competencies needed to impart such knowledge to bring about meaningful learning in the students.
3. For biology teacher to aspire for quality teaching he/she has to be conversant with innovative teaching strategies, which are integrative, child centered and activity based.
4. Furthermore growth in science (biology) requires the teacher to regularly update his/her knowledge through in-service training, attendance at conferences seminars etc but research result indicate low participation in such activities (Abu,2000).

Relevance of Quality Biology Teacher Education and the Nation's Economic Growth and Development to Vision 20:2020

Quality biology teacher education is necessary to cope with the large number of students offering the course at senior secondary school SSCE level and NCE level. The government on their own part has tried to meet the demand of biology education by training more teachers at NCE, degree and higher degree levels. Therefore to serve as a pointer to country's economic growth the quality biology teachers need to:

- a. Adopt an interdisciplinary or multidisciplinary approach in order to cope with new issues in biology.
- b. Adopt to the widened scope of biology which provide solution to most human activities and problems e.g. food, nutrition drug, pollution, population, disease, radiation, health, hygiene, family life, natural resources conservation and management as well as biotechnology climate change, and ethics (UNESCO 1986).

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- c. Adopt guided inquiry/discovery method of teaching in the biology curriculum (FME 1984).
- d. To provide the students with practical experiences in biological investigation and problem solving.
- e. Accept his responsibility to help students cope with the “information overload” of the internet learning and assist in organizing them appropriately.
- f. Be armed with sound biological knowledge he should be able to solve everyday problems relating to food, sanitation, erosion, primary health care etc. in this way, the biology teacher functions as classroom teacher, communicator in both the school and the country ensuring life long education that is necessary for economic development of the country for vision 20:2020.

Conclusion

This paper have attempted to examine the contents of the 7 point agenda by defining each of the agenda and also highlighted the implications of the agenda with particular reference to development of human capital, generation and sustenance of research and enlightenment of public/stakeholders of need for development towards vision 20:2020 in the educational sector. In furtherance of research, the paper examines the link of the 7 point agenda with vision 20:2020 as it addresses the major problems in the education sector and why quality and quantity of biology teacher education should be properly addressed. Quality is seen in the context of the skills established by a biology teacher as a result of knowledge and participation in the activities of biology teacher education and willingness to work with students and new colleagues as they enter the professions and ability to identify quality practices such as attending remedial training, be abreast of latest –researches in practice and examine his/her teaching regularity. The expected roles of quality biology teacher education for country economic growth and development towards vision 20:2020 were discussed and enumerated.

Recommendations

This paper proposes that some key measures be pursued to reposition biology teachers and educational institutions to meets the challenges for vision 20:2020 and economic growth and development, the teaching profession must be made attractive to attract best brains, the environment of learning in institutions need to be upgraded, the various teacher training curricula must be reviewed in order to accommodate new national concerns and global challenges and finally government must be prepared to invest heavily in education and further more this recommendation:

- i. Biology teacher should regularly update his/her knowledge through in-service training and updates through electronic learning.
- ii. He should be able to cope with the information overload and should assist in organizing them.
- iii. His ability to solve everyday problem relating to sanitation, food, erosion climate change, that may enhance the growth of the economy towards vision 20:2020.
- iv. Adequate funding for the provision and upgrading of necessary teaching aids, laboratory materials and tools.
- v. Teaching methods improvement, steps should be taken for continuous teaching methods review/improvement to make the teaching methods current and relevant to contemporary needs of the economy.
- vi. Compliance with carrying capacity standards, institutions involved in teacher education should limit admission of students to what their facilities can support.
- vii. It is desirable to have special scholarships and awards for quality teacher education in order to provide additional incentives for people who want to go into the teaching profession.

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