

EXAMINATION OF LINKAGES BETWEEN EFFECTIVE TEACHING-LEARNING OF SCIENCE AND FUNCTIONAL TEACHER EDUCATION IN NIGERIA

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Abstract

This paper investigated the examination of linkages between effective teaching-learning of science and functional teacher education in Nigeria. The need for functional teacher education which in turn brings about effective teaching and learning of science especially at secondary school level cannot be over emphasized. It is a well-known fact that education is the process by which one acquires knowledge, values and skills to enable one to be functional, useful to oneself and the society at large. Science education is concerned with scientifically literate society. However, the aims and goals of science education have not been well achieved in the country due to poor quality of teachers, poor teaching experience, poor remuneration, lack of on the job training, poor teaching and learning resources, etc. There is need for teachers to implement functional education and new initiatives in their preparation for teaching so as to adequately meet the new challenges of sustainable functional education in the country. This refers to the kind of education which focuses on all round development of the individual to stand the test of time, continued existence and focusing on the present and future needs of the child and society based on certain principles of education system that is relevant to the needs and aspiration of the individual. It provides relevant skills, knowledge, interests, motivation, and attitude required by the individual to function at the highest level of ability and capacity in the society. Sustainability of functional education in every society depends on the quality of the teachers. There is an urgent need for capacity building of teachers charged with the responsibility of teaching and managing different institutions, improved teacher training program, planning, supervision and monitoring mechanisms for the system is a factor that impacts positively on the success of teacher education. In order to ensure sustainable functional education based on the principles of education system, effective and functional teacher education becomes imperative and a task before everyone in the country.

Keywords: Science education, teacher education, functional education, sustainable education, motivation, work skill.

Introduction

The importance of science and technology in building and development of the nation cannot be over emphasized. It constitutes the forces that bring about the advancement of nations by liberating them from poverty to self-sufficiency. The application of science and technology has brought very outstanding changes in all facets of the world's economy and field of human endeavor (Guyana, 2009). Moreover, the level of advancement in science and technology is the basis for classifying the countries of the world under developed, developing and underdeveloped. When a country is seen as developed, it has strong influence and control over the level and superiority over others. Effective teaching and learning of science subjects

play a very outstanding role in the building and development of a nation by giving the citizens the required privilege and opportunities to widen their knowledge and potentials which in turn brings about improvement in the economy of the country. Science education ensures that knowledge is enhanced and innovation is improved and promoted in the contemporary economy of today's society (Nwogu & Ikiroma 2019). In line with this assertion, Nwanekezi & Arokoyu (2016) argued that science education is concerned with the production of scientifically literate society and the development of potential science technology manpower. This underscores the need for effective teaching and learning of science at the secondary school level.

The aims and objectives of secondary school education in Nigeria according to the Federal Republic of Nigeria FRN (2004) are

- i. To prepare the individual for useful living within the society
- ii. Higher education.

A critical look at these goals indicate the need for science education at this level of education to get them well acquainted with the usefulness of science before entrance into higher education, instead of engaging in one form of cyber crime or the other as a means of livelihood after spending many years in school. Hence there is need to inculcate the need for scientific education skills and attitudes in youngsters to enable them have the capacity to contribute to the development of their immediate society as well as prepare them to take up career in science and technology since it has been identified in contemporary times as gate way to national development.

Again, the goals of science education in Nigeria as a country shows that science education is the sure means of bringing about the required manpower and technocrats with the requisite knowledge and skills which bring about sustainable economic advancement and development. It is noted in the national policy and education (FRN 2004) that the goals of science education shall be:

- a) To inculcate inquiring, knowing and rational/critical mind in order to bring about meaningful living within the society and for democracy.
- b) To produce scientists that will give rise to national development.
- c) To support and take care of studies in technology and encourage advancement in technology.
- d) To help people understand complex natural issues or phenomena that take place in life. Unfortunately, the goals and aims of the National policy on education have not been fully achieved as majority of Nigeria students after their secondary school education still engaged in cyber crime as a quick means of escaping poverty. Nonetheless, the learning and teaching of science at the secondary school level has not been very encouraging due to certain factors affecting the teaching and learning of science in secondary school such as; quality of teachers, quality teaching, teaching experiment, teaching remuneration, on the job training or service training, quality of teaching and learning resources(Nwogu, Neighbour& Aziaka 2019).

The points being made above concerning the professional competence of teachers should not be taken for granted. This is because the professional competence of teachers is direct reflection of the quality of teacher education programme the teacher received during training. Teachers need to implement functional education and new initiatives in their preparation for teaching so that they can adequately meet the new challenges of sustaining functional education in the country. It means that when a teacher is effectively trained under the teacher education programme, the trained teacher would in turn use the knowledge, skills capabilities and attitudes acquired as a result of training to bring about the high quality man power that turns around the available resources into wealth. It then means that in the teaching and learning process the teacher is expected to apply effective teaching methods, skills,

approaches, techniques and attitudes to bring about positive change in the learner's attitudes irrespective of personal or instrumental challenges. Any effort made to improve on teacher education is the right direction to sustainable functional education.

Functional Education: Functional education is education that is practical and useful which addresses the needs and interests of the individual beneficiaries and the society. Hence, the recipient of functional education on graduation is able to be useful to himself and the society having been equipped with relevant knowledge and skills needed for performance of productive tasks. Functional education is not just education which refers to the process of acquiring knowledge and skills. It is more encompassing, meaningful, interactive, practical and most desirable. It empowers the recipient with the ability to sustainably explore without doubt, discover, functionally derive and maximally utilize the available resources of the nation (Nwogbo 2017).

Thought for functional education originated in the United States and Western Europe (Nwaka 2022). In the United States and in Germany, it refers to the type of education that comes spontaneously from the influence of the environment. They see it as a kind of education that is natural as opposed to the deliberate, goal-oriented education that is directed by man (Zeilberger, 2019). In Western Europe, functional education refers to education that comes from the child's needs that uses a child's interest as a mechanism for activating him towards his desirable activities (Nwaka 2022). Its purpose being to develop the life of the mind that acts from the wholeness of the mind which in turn acts from the wholeness of organic life with relation to practical life and values in the present and in the future. Nigerians perceive functional education as education that equips the child with the knowledge, skills and values needed for effective living within the environment and the world at large as the need arises. It is oriented towards acquisition of survival skills for service, productivity and contribution to the development of society (Ogbuji, 2014).

It is noteworthy that functional education includes training not only in basic skills and special abilities but also in the right use of them (Azubuike, 2021). It means that education becomes functional only when the learner is able to apply what he has learnt effectively and appropriately Adagba & Asaju, (2014) maintain that functional education is that type of education for which there is an anticipated application which thus assumes that the acquired skill is transferrable into action by manifestation in learning activities. Functional education inculcates values that are essential for harmonious co-existence as individuals and nations (Ogbuji, 2013). Furthermore, it focuses on trainings in personal and social values needed in the society for practical solutions to everyday problems. During the launching of the Universal Basic Education programme by the former president of Nigeria, Chief Olusegun Obasanjo in Sokoto on 30th September 1999, he defined functional education as follows: education is not just a matter of acquiring skills. Education is better understood when we see it also as means of instilling especially in our young ones the importance of a number of fundamental values such as devotion to the wellbeing of our motherland, respect for the constitution and the importance of democratic governance, a sense of dignity to labour and moral uprightness, as well as respect for the rights of other citizens (Federal republic of Nigeria, 2000). A holistic educational experience like functional education is capable of integrating young Nigerians into the society with relevant knowledge, skills and attitudes for meaningful co-existence, sustainable development (Adewale, 2014). Therefore, functional education when properly implemented is capable of producing more than enough manpower in Nigeria who are capable to manufacture raw materials, and tools needed for both local and international markets, invent new designs, discover drugs that are capable of curing diseases hitherto known as curable, and transform the national from consumption to manufacturing status (Udoh and Akpan 2014).

Sustainable Functional Education

Sustainable functional education refers of the education which focuses an all-round development of the individual which stands the test of time. It is continuous, lifelong and focusing on the present and future needs of the individual in the society. In other words, it is a process of setting and maintaining a place in the education system. Sustainable functional education possesses the following principles Zealberger (2019);

- a. The child must be put at the center of the curriculum whose development is not based on principles that are exterior to the child.
- b. Education system must be based on the natural needs of the child to inquire and to know, to observe and to work or play by arousing the child's spiritual longing that will not come by.
- c. Education system must see the child from the standpoint of his own world views, describes him in terms of concepts drawn from his experience, teach him according to his criteria, and relate with him as a person that deserves respect and nourishment.
- d. Teachers in functional education system are those who stimulate the moral and spiritual needs of the learners, aid them to acquire knowledge through self-study and personal experiences rather than spoon feeding them with facts which are foreign to them.
- e. Introduces the child to works and to subjects that prepare him for social activities as the child must in future live in a society.
- f. Develops intellectual and moral capacities of the learner rather than force feeding him with facts that have no relevance to his real life but are accumulated in the memory as foreign substances that are easily forgotten.
- g. The classroom is the laboratory where leaning activities form a bridge between the learner and his natural needs.
- h. The educator should be knowledgeable of the child's physical and emotional development and the concomitant interest shift as to enable him adapt his teaching to the natural growth of the child.
- i. Examination does not constitute a challenge on the regurgitation of facts fed into the memory on the course of study but an achievement summary of the learner's performance in various learning activities during the school year.
- j. Acknowledging individual differences in learners and as such does not subject every learner to the same curriculum content and skill development.

In order to ensure sustainable functional education based on the above principles, effective and functional teacher education becomes imperative and a task before everyone in the country. In other words all hands must be on deck to ensure achievement of sustainable functional education in the country for everyone to survive. It is only when a teacher is prepared for his job through effective teacher education program that he can deliver optimally. Therefore, there is need to overhaul the teacher education systems and sectors in the country to produce a total teacher with the required skills, knowledge, and value relevant to the present generation.

Teacher education; this refers to the professional education of teachers towards attaining attitudes, knowledge and skills for productivity and in line with societal demands and needs (Ubogu, 2020). It has been realized that development of well-educated and professionally trained teachers is an important aspect of healthy educational development (Asdua, 2021). If education is not achieving the desired goals, it may be reflecting the type of its teacher and the type of teacher education they received. Any country or nation that wants good economy and productive citizens must put in place a comprehensive teacher education system that is adequately managed, funded, supported, supervised and motivated. Consequently, teachers should be well equipped and motivated to effectively discharge their duties in order to sustain functional education by the way they teach the young ones.

Motivation is of paramount importance to put in their best in their efforts to deliver optimally. This is true because performance that is not well motivated does not accurately show the level of learning that has occurred (Anusiem, 1994). Therefore human resource management is another aspect of the school system that should be carefully handled for effective teaching and learning. It is seen as the part of the organization or institution that is concerned with the education of the learners. Conditions have to be created which would make the employed teacher stay on the job and cope with the demands of teaching and learning. Human resource management is a set of organizational activities directed at attracting, developing and maintaining an effective work force. Employment and maintenance (keeping) of knowledgeable good teachers in schools is critical to the success of the schools and the country like Nigeria. However, it is pertinent to point out that human resource management in schools may be affected by the quality of teacher, years of experience of the teacher, skill training and retraining, staff development, motivation and maintenance skills (Ogbuji, 2013). Staff skills in this context has to deal with obtaining teachers with appropriate skills, abilities, knowledge and experiences to fill the education system. This is because such caliber of workers are important in human resource planning, job analysis, recruitment and selection. Motivation skill is a means by which an employer uses to cause the employee to behave in a particular way or make him feel determined to do something useful to the work place. It is not only concerned with recruiting the right caliber of staff but includes looking after them so that they will want to stay to give the best to the job. This is done only through proper understanding of hopes, fears, aspiration and of the person that a manager can decide as to how to motivate his subordinates (Nnamdi & Nwite (2014). They however argued further that the employer must find out why people behave the way they do and that the need of every person is classified under biogenic-group, socio-genic group and ego-group. The working conditions of teachers seem to be very poor and not taken seriously by the government. Teacher education includes the training of the student-teachers by providing them with the relevant knowledge, attitude and skills with which to function effectively when absorbed in the teaching profession. It serves to equip would-be teachers with the conceptual and theoretical framework within which they can understand the intricacies of the profession. It is also a process of nurturing prospective teachers and update qualified teachers' knowledge and skills in the form of continuous professional development. Teacher education therefore is the process whereby the prospective teacher, would-be teacher or intending teacher is provided opportunity to develop cognitive perspective, affective disposition and psychomotor competencies which endow him or her with the qualities, capacities and capabilities for teaching (Ipaye & Ofoebe, 2006).

From the foregoing, functionality and sustainability of education depend on the quality, quantity, commitment of the teacher that develops skills in the learners. Although the validity of any education system is gauged by the relevance of the curriculum (Nwaka & Orji 2017) without competent teachers nothing can be achieved even in the face of the most evolutionary and well intentioned education policies and programmes (Nwaka, 2022). Education is therefore determined by the quality of its implementation process which in essence requires effective education of teachers that would impact the skills appropriately to the learners in the classroom situation.

As mentioned above, teacher education in Nigeria is being challenged by myriads of problems which have negative impact on teacher education and function alike in Nigeria. They include inadequate funding, insufficient facilities and infrastructure, inadequate and non-functional information technology (ICT) facilities; students low entry requirement, poor mode of admission, insecurity of lives, incompetent and non-committed teachers etc. No wonder why many teachers' education colleges and institutions have been criticized for the poor quality of instruction and training provided the students' teachers and some other closed.

The training methods and approaches seem outdated and do not take into consideration the changes taking place in both the school environment where the teachers are likely to teach and the requirements of a more technological global environment.

In many of these teacher education institutions, instructions are mostly theoretical rather than practical. The problem however arises due to the craze for certificates as majority of the students-teachers just want to be professional teachers (Nwaka 2022). Again, there are teaching needs for teachers in the faculties and colleges of education. The development of their capacity for implementation and sustainability of functional education system is critical. Poor quality of teachers charged with the duty of training knowledgeable and good teachers is a huge problem. There is an urgent need for capacity building of teachers charged with the responsibility of teaching and managing different institutions, improved teacher training program, planning, supervision and monitoring mechanisms for the system is a factor that impacts positively on the success of teacher education. There is also urgent need to develop research capacity for teacher trainers in different institutions of higher learning otherwise building more schools, pouring more money into education system deploying adequate number of teachers who are not good and knowledgeable. Similarly mere availability of human and material resources cannot do the magic of sustaining functional education.

Teacher education for sustainable functional education in Nigeria: The focus today is making functional education sustainable so that graduates would be useful to themselves and the society. It then means that the role of teacher education and professional development of the teachers presently in service are more important since they cannot be pushed away from service and replaced with assumed better trained teachers. This places teachers' education in the fore front of the sustainability process which has to do with an enduring inclusive and quality teacher education for quality and sustainable functional education. Africa as a whole should invest on its teacher education now. Teacher education system must be put in proper perspective to enable it play its expected significant roles for sustainable functioning education in the country.

In order to achieve quality and functional teacher education it must be relevant and meaningful to the changing needs of the society. Investing on quality teacher education is a vital tool for achieving functional society which allows every pre-service teacher to acquire the knowledge, skills attitude and qualities important to put in shape a sustainable future (Uboyu 2020). For teacher education to be functional the trained teachers should be knowledgeable and mature in motivating the learners to be employable and effective in relevant human endeavours. Teachers in a functional education system are those who stimulate the morale and spiritual needs of the learners, aid them to acquire knowledge through self-study enthusiasm, rather than scholarship and understanding of the child and his needs rather than following a rigid curriculum (Zeilberger 2019). Fortunately the United Nations educational scientific and cultural organization (UNESCO) has been making frantic efforts to enhance teacher education and training institutions as the beneficiary institution. This effort is to provide quality teacher education and training by:

- 1) Strengthening existing pre-service programs particularly through information and communication technology, technology-supported, blended training programmes and successful information technology (ICT) supported innovations.
- 2) Enhancing the capacity of teacher trainers with information technology (ICT) competences to improve the quality of teaching and learning.
- 3) Improving networks of teacher education / training institutions for promoting knowledge sharing on effective teaching practices (UNESCO 2020).

Presently, about (10) ten African countries: Congo, Cote d'ivoire, Ethiopia, Liberia, Namibia, Tanzania, Uganda, Togo and Zambia have benefited with additional funding from Chinese government. The Open University Teachers Education in Sub-Saharan Africa (TESSA, 2020)

are also playing their part in making teacher education relevant. TESSA suggests that teacher educators should practice active teaching and learning; developing more learner centered approaches to teaching. Explicitly, it was pointed out that diversified curriculum and various programmes of teacher education (literacy programmes, vocational education, scientific education, teachers training and special education) succeed to equip the would-be teachers continuously with a broad array of relevant knowledge, skills, competences, attitudes, beliefs and values needed to bring about particular changes in the learner's behavior. These changes however are expected to become enduring part of the learner's life making him literate, self-confident, self-reliant and useful personality in whatever he chooses to do if well implemented in schools by the teachers.

The way forward

The following suggestions have been made by Nwaka (2022):

1. Government of African Nations should invest in quality education which is crucial for achieving functional education, to this end, teacher training instructions need a total overhaul in skill orientation through adequate curriculum design, staff recruitment and students in-take in the envisaged areas of knowledge, skills and values to be acquired.
2. The selection process of teachers' education programmes should be overhaul. Would be teachers should be selected mostly through other procedures of screening like interviews which would help to determine interests, attitudes and attitude of the applicant.
3. Practical teaching and supervision of the would-be teacher should be taken seriously for them to practically demonstrate their acquisition and mastery of desirable knowledge, skills and values relevant to sustaining functional education; ensuring that they effect the necessary corrections they were given during the training exercise. This should also be followed up with a repeat visit.
4. Maintenance of minimum standard of educational institutions should be ensured by appropriate agencies charged with the responsibilities through periodic accreditation and supervision.
5. There should be adequate funding, provision of adequate human and infrastructural facilities, laboratories, studios, workshop and libraries, and suitable environment in teacher education institutions to ensure attainment of set objectives.
6. Those in charge of teacher education programmes should support the development of pedagogical contents, knowledge, application of new knowledge in practice, a professional attitude and self-defined learning strategies should be reflective and inquiry learning.
7. The government should henceforth ensure that the objectives of our teacher education system in general towards producing a total teacher with requisite skills, knowledge and values relevant to 22nd century and beyond.

Conclusion

In conclusion, it is glaring the fact that teacher functional education which in turn brings about effective teaching and learning in the classroom situation, is necessary for the nations by way of liberating them from poverty to self-sufficiency. Functional teacher education implies a functional education system and consequently a functional society where the needs of the individual and the society are met. Qualitative teacher education breeds genuine and integral development

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