

THE NEEDED RESOURCES FOR UBE AND STM EDUCATION IN NIGERIA

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Abstract

This paper discussed the inclusion of primary education in the MDGs, the substantial progress and the challenges of a number of educational policies such as UPE, UBE and EFA (as its international antecedent), put in place by the Federal Government to tackle the problem of illiteracy, dropout and poor enrolment in primary and secondary schooling system in Nigeria. A historical synopsis of STM education was presented, and an attempt was made to also discuss, prime factors that will enable STME to be functional enough to meet the challenges of UBE in Nigeria.

Keywords: Universal Basic Education, STM Education, challenges, Teachers and STME Curriculum

1. Introduction

The Millennium Development Goals (MDGs) positioned universal primary education as one of the eight major goals. As the second goal of the MDGs, it anticipates achieving universal primary education by 2015. It stipulates that by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling. The goal also recommends eliminating disparity in primary education, preferably by 2005, and in all levels of education not later than 2015.

The inclusion of primary education in the MDGS must have been prompted by the 1990 Jomtien World Conference on Education for All (EFA), as well as the New Delhi Declaration (1991), which requires strict efforts by the E-9 countries (nine countries of the world with the largest concentration of illiterate adults) to drastically reduce illiteracy within the shortest possible time frame. It is also a demonstration of commitment to the Durban statement of commitment (1998) and Organization of Africa Unity (OAU) Decade of Education for Africa (1997–2006), which also requires African states to generalize access to quality basic education as a keystone for sustainable socio-economic development (Federal Ministry of Education, 2000).

The Universal Basic Education (UBE) programme was launched in September 1999, but actually took off in 2000/2001 school year. The programme was with the sole purpose of ensuring that illiteracy is reduced to its barest minimum among the adult population of Nigeria in the nearest future. In pursuit of this goal, the UBE programme aims at making education compulsory for the first cycle of nine years for every Nigerian child.

The specific objectives of the UBE programme, as outlined in the implementation guidelines of the Federal Ministry of Education (Federal Ministry of Education, 2000), are as follows:

- ✚ Ensuring unaltered access to 9 years of formal basic education;
- ✚ Provision of free, universal education for every Nigerian child of school going age;
- ✚ Reducing drastically the incidence of dropout from the formal school system through improved relevance, quality and efficiency;
- ✚ Ensuring the acquisition of appropriate levels of literacy, numeracy, manipulation, communication and life skills as well as the ethical, moral and civic values needful for laying a solid foundation for lifelong learning (*Source: UBE, 2000*).

A Universal Basic Education Commission was established by an Act of the National Assembly as a way of ensuring the proper implementation of the objectives of the UBE programme. It is the responsibility of this Commission to coordinate the activities of the programme throughout its first nine-year gestation period, from 2001 to 2009 and beyond (Federal Ministry of Education, 2000).

The current UBE scheme has been considered as an offshoot of previous educational schemes and policies that failed. The UBE is the fourth in the ladder of educational policies in the country. (Aluede, 2006; Edho, 2009). The starting point of Nigeria's educational

policies dates back to the 1955 comprehensive education laws of the Western Nigeria, 1957 Universal Primary Education (UPE) of the Eastern region and the 1976 UPE programme. Each of the policy existed and was established by different government administration and was criticized when a new government rides into power as Utibe (2001) asserted, The UPE contributed to a lowering of the standard of education in Nigeria at the primary school level. The UPE of 1976 was faulted in scope, planning, financing and a general lack of accurate data of children that would be affected by the scheme as absence of accurate census data in the country at that time prompted the failure. The UPE was primarily designed to reduce the educational imbalance between the North and South backed by the oil boom. The government embarked on the full responsibility of training teachers for the scheme. The teachers gotten from the emergency training programme which made various school leavers to obtain the TC II certificate and thus, raised the quality of staff strength in the primary school sub-sector throughout the federation.

The incessant political changes in the past constituted the problems of ineffective implementation of the policy statement of EFA. In decades past, military intervention occasioned by changes in government in quick succession, variations in the non-uniformity in the system of primary education, instability, which characterized the Nigerian political scene, has always led to changes in educational policies most especially, at the primary school level. Each government regime rationalized the policy on education on its own accord.

Utibe (2001) emphasized that, ‘the UPE programme in the then two region of the country was improperly planned and hurriedly executed’ leading to a waste of millions of Naira. The Taiwo Commission of 1960 was charged to investigate the crisis rocking the UPE scheme reported, among other things, a fall in standard. The Dike Commission recommended its abolition and subsequent modification. Following several recommendations to government, the federal government approved the third National Development Plan (1975-1980) UBE in 2006. The quality of a nation’s education is a process and product of its educational policies as education is an instrument of change and a major instrument for socio-economic as well as political development.

The general chorus of disapproval in the falling standard of basic education and a sharp decline in the morals of primary school children brought about the introduction of the UBE. The UBE challenged with the problems facing basic education in Nigeria before its introduction include: dearth of facilities, inadequate supervision, shortage of personnel, lack of funds, high prices of textbooks, incoherent implementation of the curriculum, dropout rate (Denga, 2000; Edho, 2009).

2. Stm Education

Science, Technology, and Mathematics Education (STME) have been referred to as a meta-discipline, and the creation of a discipline based on the integration of other disciplinary knowledge into a new whole. This interdisciplinary bridging among discrete disciplines is now treated as an entity, known as STME (Morrison, 2006). Thus, STM Education offers students one of the best opportunities to make sense of the world holistically, rather than in bits and pieces. It should be noted, however, that STM Education is an interdisciplinary approach to learning; where rigorous academic concepts are coupled with real world lessons as students apply STM in the context that make connections between schools, community, work and the global enterprises, enabling the development of STM literacy and self reliance skills, and with it, the ability to compete in the new economy (Tsupros, and Hallinen, 2009). Science and Technology have been instrumental in shaping and improving the life of humankind. While science tries to explain things, technology is what has enabled humankind to improve its standard of living, not only to build houses, supply food, health, travel and communications but arts, sculpture, music and literature (Mutasa in Nwachuku, 2009). Thus, the purpose of technology is the application of human knowledge for the improvement of human life. Hence, technology, therefore, seems to be a cultural activity and every society is technological and scientific in varying degrees and mathematics is the vehicle for doing science and a tool for technologies (Wasagu, 2009).

Past researchers revealed that Africans developed Arithmetic, Algebra, Geometry, trigonometry and other advanced mathematical science (Diop, 1974). They employed these concepts in the construction of pyramid, mathematical calculations relating to the flooding of Nile, and in the division of land along the Nile valley. The Egyptians also possessed considerable knowledge of chemistry, and the use of metallic oxides is evident from the nature of colours applied to their glass and porcelain. They were even acquainted with the influence of acids upon colour. Hence, they were able in the process of dyeing/staining cloth, to bring out certain changes in the hues by the same method adopted in our own cotton works (Sweeting and Edmond, 1989).

Amongst a host of technological inventions were tools-copper and iron and latter steel, boat and ship design. The sale of sails was one of Egypt's industries. Also, there existed the art of shaving, use of wigs, wearing of kilts and sandals, musical instruments, chairs, beds, cushions and jewelry. There was smelting of iron for producing good quality carbon steel. With this enterprise, they were self employed. Analysts have argued tremendous improvement recorded in science and technology over the years have been met with a

corresponding decrease in the technological skills possessed by individuals and their communities which make them self reliant. This could be witnessed in many developed societies where the science and technological discoveries and inventions have been applied in different human development fields for national development.

In our national context, several strides have been made by many people in the rural and urban Nigerian where skilled men had produced the needed farming implements, local guns for hunting animals in the forests, machetes and hoes for clearing the land for agricultural activities, and many other locally-made tools that would earn them a living; women were able to brew local beverages and wine, weave and dye cloths, utilize clay materials for earthenware bowls, pots, among others. Nowadays, it is difficult to find individuals with such transferable skills in the community (Nwachukwu, 2009) due to the non-commitment of the system to the development of local human potentials and resources in the environment. This means, technology now belongs to large corporations and people have increasingly become jobless, job seekers and indeed marginalized in the industrial development, production and employment sector. Thus, if the bridging of these different disciplines “S, T, M”, are wisely utilized, it will help to meet the challenges of UBE and STM education itself.

3. Current Situation of Stm Education in Nigeria

Science, Technology and Mathematics Education in Nigeria is characterized by inadequacy of content and ineffective methodology by teachers, dearth of facilities, equipment and materials in our laboratories, as well as dominated socio-cultural lapses (Oriafo, 2002).

The present scourge of unemployment in Nigeria clearly reveals that the STME taught in schools at all levels do not prepare Nigerian graduates to function well as expected (Nwachukwu, 2009). The courses which should be taught as hands-on and minds-on practical courses are basically taught theoretically; this makes the learners not to benefit maximally from their education.

3. 1. Ube Vision Statement

At the end of 9 years of continuous education, every child through the system should have acquired appropriate level of literacy, numeracy, communication, manipulative and lifelong skills, and such skills that are employable, useful to individual and the society at large by possessing relevant ethical, moral and civic skills.

4. Resources For A Functional Ube And Stm Education Programme

4. 1. Development and Motivation of Teachers

No educational system can rise above the level of its teachers. Many laudable educational initiatives have failed mainly because they did not take into account the "teacher factor". If the government is committed to ensuring the success and realization of UBE's vision statement, which can only be realized by a functional STM education, it is worthy of note that the teachers will always be a major part of the process. Efforts to raise the level of general education of teachers (as well as efforts to raise the level of their professional preparation) should be pursued, broadened, and intensified with all vigour. Added to these is the very crucial issue of career-long professional development of serving teachers. This should no longer be a makeshift affair. Teachers associations, universities, colleges of education and the National Teachers Institute (NTI) should be fully mobilized to develop more systematic, career improvement-oriented, and hands-on-skills targeted continuing education programmes for all categories of teachers.

Teachers should also be fully involved in curriculum development, in school management, in social mobilization, in the overall educational decision making process. Their professional preparation for this form of full involvement will therefore be an integral part of the future systematic educational personnel development programmes.

Above all, teacher allowances should be paid regularly and should be kept at a level that is commensurate with the professional nature of teaching, while other incentive and welfare packages are to be negotiated. Steps should be taken to make the school environment learner-friendly as well as teacher-friendly. This involves the provision of appropriate forms of infrastructures and facilities, and a full recognition of the professional autonomy of teachers and school administrators.

The problem of shortage of qualified teachers should be addressed through a wide variety of innovative and creative approaches, adapted to the peculiar needs of different parts of the country. Such programmes will have to be carefully monitored to minimize the risk of their crashing as was the case in the past.

4. 2. What should be the nature of the STME Curriculum?

For STME to be able to topple the challenges of UBE in Nigeria, what is needed is a curriculum that teaches not only the science and mathematics, but also the technology and engineering. This would make the curriculum truly trans-disciplinary.

What then should be the nature of a STME curriculum? What philosophical and theoretical elements should be used to guide the design and development of such a curriculum?

Morrison (2006) suggested the following, which has been summarized as guide to the design of any of STME curriculum:

Standards driven– The standards represent the desired results by building on the best of current practice, standards aim to take us beyond the constraints of present structures of schooling toward a shared vision of excellence (NRC, 1996).”

Understanding by Design (UbD) – is one of the most widely used and research-supported curriculum design paradigms in use today. Many countries, state departments of education, schools of education at the college and university level, informal education entities, and commercial publishers model their curriculum on the UbD template. The three stages of curriculum development advocated by UbD (i.e., Desired Results, Assessment Evidence, and Learning Plan) represent a rational and logical approach to using standards (Desired Results) to backward map the assessment evidence and learning plan.

The UbD maintain a belief on constructivist teaching pedagogy. But UbD is not exclusively a model for constructivists; it lends itself to sound instructional design principles regardless of orientation to teaching and learning. Today the principles of backward design espoused in this landmark work are being implemented in schools around the world as dialogue continues on educational reform in the twenty-first century (McKenzie, 2002).

Inquiry-based teaching and learning – It has been hypothesized that students who learn by inquiry-based teaching strategies will show a greater understanding of content and concept acquisition than students learning through expository learning. Examples of an inquiry approach have been documented in studies by Odom (1996). Each research study sets out to compare science scores from students involved in expository versus innovative teaching practices. Their research results describe increase science comprehension and achievement and more positive attitudes towards science.

Problem-Based Learning (PBL) – is a student-centered instructional strategy in which students collaboratively answer questions and solve problems and then reflect on their experiences (inquiry). Characteristics of PBL are:

- ✚ Learning is driven by challenging, open-ended problems;
- ✚ Students work in small collaborative groups;
- ✚ Teachers take on the role as facilitators of learning.

Performance-based teaching and learning– Much evidence has been gathered about how performance-based teaching, learning, and assessing provides the means for improving student achievement (Falk and Darling-Hammond, Kentucky Institute for Education Research 1995). For example, research indicates that teachers in Vermont and Kentucky are asking their students to write more and to do more work together in groups. Such research is providing the empirical information needed to examine the tenets underlying assessment reform efforts.

Teaching Learning, and Assessment– The teaching, learning and assessment which is hinge on (Engagement, Exploration, Explanation, Elaboration, and Evaluation) as cycle has been advocated by many curriculum designers and educational researchers as an effective planning and teaching paradigm that leads to improved student performance (Colburn and Clough, 1997). Since its introduction in the 1980's, the cycle has been extensively researched, with the results showing enhanced mastery of subject matter, increased ability in developing scientific reasoning, and positive increases in cultivating interest and attitudes about science (Lawson, 1995).

Digital curriculum integrated with digital teaching technologies – STM education affords an opportunity to deliver curricula to students in non-traditional ways. It is time that high quality digital curricula be developed and be made available to classroom teachers and curriculum designers at the local level. Digital curriculum has many advantages over traditional, analog (paper-based) curriculum. It can be web-based, meaning it can be readily accessible from any Internet-connected computer, can be accessible to people with disabilities, can be readily updated by teachers and/or schools, and is often more current. In addition, digital teaching devices such as computers, interactive whiteboards, student response systems, LCD projectors, digital cameras, and digital microscopes can be used to complement the digital curriculum implementation. A STM education curriculum should be designed to take full advantage of the digital format.

Formative and summative assessments with both closed and open-ended patterns – Morrison (2006) asserted that, today's standards are comprehensive in skills and processes, inquiry, and content; are robust and rich; often have multiple right answers; and require performances to assess them. Consequently, traditional modes of using selected response assessments alone are not sufficient to gather evidence of student understanding of these standards. As a result, complementary and alternative forms of assessment have emerged. Alternative assessment means any assessment format that is non-traditional, which requires the student to construct, demonstrate, or perform (Doran, et. al., 1998).

5. Summary and conclusion

This paper has emphasized the challenges of UBE and STM education in Nigeria, and has suggested possible solutions—resources that will reposition and equip STM education to meet the needs and vision of UBE within a short time. The challenges confronting UBE will never be met until STME is well defined in form and function. The urgent need of adequately equipped teachers that should function as STME tutors at that level cannot be overemphasized. UBE and STME will remain vague, arbitrary, and in fact, another fashion in Nigeria education system, if a proactive measure is not taken to train and retrain STME tutors.

Consequently, STME curricula should be developed and should be driven by problem-based learning that will encourage problem solving, projects and challenges which are embedded within and as culminating activities in the instructional materials. The problem-based learning will allow for the teaching and learning of the underlying and supporting science, mathematics and technology skills, processes and concepts that are transferrable.

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