

Abstract

This paper examines the basis of technology as a vital resource, which school administrators and stakeholders should maximally utilize to achieve in the educational system. It focused on the various types of indigenous and modern technologies in Nigeria, stability pitfalls and the strategies to embark on, in order to boost Technology education in senior secondary schools in Nigeria. The concept, and need for technology education are reviewed. Lastly, conclusion, and recommendations were drawn as a contribution for enhancing technology education in secondary schools in Nigeria, if the school system must realize optimum objective based on skill, competency, and self-reliance.

Introduction

The history of technical education has come a long way, before and after the colonial days, to the time of independence in 1960 and up to this day. Traditional education is what is being regarded as technical or technological education.

The new national system of education 9-3-4 was channeled towards rendering the entire educational objectives, which is based on the national goals of the country, particular attention based on Science, Technology, and Vocational Education as it were in the revised (FRN, 2004).

The National Policy on Education stated that Technical and Vocational Education be issued as a comprehensive term referring to those aspects of the technological educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. Technical and vocational education is further explained to be:

- ◆ An integral part of general education.
- ◆ A means of preparing for occupational fields and for effective participation for in the world of work.
- ◆ An aspect of life long learning and a preparation for responsible citizenship.
- ◆ An instrument for promoting environmentally sound sustainable development.
- ◆ A method of alleviating poverty.

Nigeria is a country with potentially talented individuals, the land being enriched with various resources for craft, weaving, woodwork, goldsmith, farming, food production, etc. Having said this, there exist some hitches that have resulted to instability of technological education in the school system. Olaitan (1996), described the situation as an "incomplete career exploration".

This paper cited the nature, and importance of technological education, looked into some of the pitfalls that has brought stagnancy of technology in schools, and considered the strategies to endear in order to 'push up' technology education in the senior secondary schools Nigeria. Conclusions and recommendations were drawn as a contribution for enhancing technological impact and effectiveness, so that both the national and educational sector objectives can be maximally realised, culminating to a land full of bright opportunities for all citizens.

Concept and Nature of Technological Education

According to Chambers Dictionary, the word 'boost' means 'to push up': to advertise or promote (Technology). According to Daramola (1990), Technology means applied science or the application of scientific facts and knowledge to provide solutions to human problems. It is a positive and practical application of science in the service of man ...through the production of material needs of the society. "Technological education is defined as a generic name for all forms of specialized vocational-technical education and training programme aimed at developing people's knowledge and skills in the practical (Industrial) arts", Fagbemi (1988 p.49).

Okorodudu (2000), contributed that technological skills acquisition has to do with knowledge, methods and processes which individuals adopt for the transformation of both crude human and material resources in their environment into a high level of quality change to obtain an improvement in their utility values. This is what can be described as appropriate technology.

In Nigeria, Technical Education is given in varying forms and at different levels of the educational system. It is given through, apprenticeship in the technical institutes and industrial establishments and in the formal technological institutions (Anonymous, 2005), cited in Imararhigbe (2003). At the senior secondary school level, it is taught as separate technical subjects such as: woodwork, metal work, applied electricity, basic electronics, technical drawing, building construction etc.

Nigeria is a land blessed with a lot of cultural and oriented skills. According to Osuala (1987) Nigeria has mined gold, coal, tin, iron, salt and other minerals. These indigenous technological skills include: farming skills, technical skills, pottery making skills, industrial casting and smiting skills, salt making skills, cloth weaving skills, craft skills (Afigbo 1980; Onwujeogwu 1981, Okorodudu, 1995; Osuala, 1987; Obijole, 1999 and Suleiman, 1999).

The above could be viewed as a local indigenous technology, while the lists below represent the modern skills involving both local and foreign technologies (*sic*).

The Federal Government of Nigeria (1981) Outlined these Technologies as

1. Accounting, bookkeeping and shorthand.
2. Music and arts involving string instrument drumming, composing, writing and constructing painting and sign, photography, leather work, interior work and decoration etc.
3. Wood work and building: cabinet making, carpentry, plumbing/pipe fitting, bricklaying, upholstery and boat building amongst others.
4. Computer technology and mechanical: computer operating (typesetting), programming, repairs and maintenance, auto-electrical workings, vulcanising, panel beating, welding, foundry, vehicle, driving etc.

With these culturally endowed technologies, apart from computer technology, which is a transferred technology. The cultural technologies stands as a rationale for creating awareness of what is expected in the new system of education in Nigeria, especially, at the Senior Secondary School level.

Science and technology is largely based on the acquisition and utilization of specific technological skills for the satisfaction of the numerous human needs in the society (Okorodudu 2000). Technology education stresses the engineering aspect of vocational education such as electronics, electrical, mechanical and automobile works. Indeed it involves the understanding and practical application of the basic principles of mathematics and science (Aghenta, 1985).

Need for Technology Education

Technology can Make Education more Individualistic: Different combinations of teachers, students, materials, space, time, ...can respond more to actual learning needs and less to administrative convenience. The use of technology can increase the alternatives and so permit the student to find his own direction more easily.

Technology can give Instruction a more Scientific Base: Technological education could provide a framework necessary for designing conditions of learning that are more closely based on what is known about how human beings learn. Research for example reveals the importance of reinforcement and reward as an integral part of learning. Technology has the potential to guide research into asking the right questions as well as apply research results to schools and colleges.

Technology can Make Instruction more Powerful: New forms of communication give man added capability. The media of technology can simulate reality, bring distant and far removed events to students, compress or expand the time a visual or auditory event takes place, magnify or reduce the size of objects, dramatize or simplify events, and so forth.

Technology can Make Learning more Immediate: Technology can help to bridge the gap between

the world outside and the world inside the school. Through television, film, and any other new media a curriculum can be made dynamic. Knowledge and reality filtered through the words of textbook and teacher, all too often reach the student as predigested conclusion, neatly packaged. However with the use or application of Technology reality can be studied almost directly and the student's route to knowledge and understanding can be more meaningful.

Technology can Make Access to Education More Equal: Through television or film (or other channels) nearly every urban school and the students and faculty of a small rural college can have direct access to the greatest libraries of the country. People can be anywhere to take advantage of technology. It transmits the impact of knowledge to all people. The above is the benefit of Technology in Education as proffered by (Brown, Norbert and Srygley, 1972).

Accepting New Roles for Teachers in the Classroom: Technology integration brings changes to teachers' instructional roles in the classroom. The teacher's roles in a technology-infused classroom often shift to that of a facilitator or coach rather than a lecturer (Henriquez and Riconscente, 1998). Technology use also tends to foster collaboration among students (Tinzmann, 1998). Scheffler and Logan (1999) documented these and other changes in the dynamics of the classroom.

According to Durojaiye (1976) Technological education helps to provide a conducive-learning environment through the provision of instructional aids and other resources. Students after careful interaction with these resources acquire knowledge and skills, which motivate them to learn more.

Pitfalls to Technology Education in Schools

The writer is of the opinion that the educational system in an effort to have a revolutionary change in its learning experience is faced with a lot of obstacles, which tends to affect seriously technological education in senior secondary schools in the country.

Failure to have a shared vision, clear goals, and objectives with defined measurable outcomes can doom a change effort right from the beginning. A poorly designed implementation plan that fails to define tasks, responsibilities, and ongoing benchmarks also will result in the change effort failing. Clearly, failure to assess progress and challenges and to make needed changes is an implementation pitfall with dire consequences. Administrators who do not communicate with stakeholders about successes and challenges also dramatically increase the risk of failure.

In addition, some pitfalls unique to technology leadership may require special attention. One of the most significant is the need for professional development for both administrators and teachers. Because they often may have not received adequate preparation for technology use in their pre service experience, many educators have had to learn at the same time as they try to use the technology.

Technology use, if it is to be successful, needs to be implemented systematically rather than in isolation. Failure to tie technology use to the required curriculum may result in technology being perceived as an instructional add-on. Teachers, may be frustrated when they realize that to use technology effectively; they will need not only to learn technology use and integration but also to modify their instructional and assessment practices. Administrators, need to share the change process, beginning with why the change is necessary, what the benefits expected are likely to be, and what the consequences are of not making any changes, with respect to the emphasis on providing a full education to all students. Administrators, need to encourage and support professional development opportunities related to technology. Because some teachers are less comfortable with technology than with other aspects of their teaching, they need constructive feedback that will enable them to take risks using technology in even more ways.

Lack of appropriate technology infrastructure and support also can cause implementation problems that can be most fatal. Teachers and students should not be expected to be experts in technology infrastructure and support. The equipment should be dependable and easily accessible. Teachers need to experience technology as something that they can build lesson plans around. They should not have to worry that their planning efforts and schedules may be frequently impossible because of equipment failure or unavailability. A few negative experiences will lead teachers to believe that technology use is more problematic than helpful and will likely reduce their technology use. Timing is everything, particularly when it comes to technology. "Real learning takes place (or

stops) when actually trying the new skills," stated McKenzic (1998). "The best way to win widespread use of new technologies is to provide just-in-time support, assistance, and encouragement when needed. Not tomorrow. Not next week. Now!" He wrapped up.

Strategies for Boosting Technological Education in Senior Secondary Schools

Leadership to a large extent, influences the direction that technology is trying to go. As Koonz, O'donnel and Weihrich (1972) stipulated, "Strategies give direction". Consequently the following strategies were discovered: -

Knowledgeable and Effective School Leaders

Knowledgeable and effective school leaders are extremely important in determining whether technology use will improve learning for all students. Many school administrators may be uncomfortable providing leadership in technology areas, however. They may be uncertain about implementing effective technology leadership strategies in ways that will improve learning, or they may believe (their own knowledge of technology is inadequate to make meaningful recommendations. Because technology is credited as being a significant factor in increasing productivity in many industries, some people believe that more effective use of technology in schools could do more to improve educational opportunities and quality. Research indicates that while there are poor uses of technology in education, appropriate technology use can be very beneficial in increasing educational productivity (Byrom & Bingham, 2001; Clements & Sarama, 2003; Mann, Shakeshaft, Becker, & Kottkamp, 1999; Valdez, McNabb, Foertsch, Anderson, Hawkes, & Raack, 2000; Wenglinisky, 1998).

Five qualities or "action-and-mind sets" that distinguish transformational leaders: Strong sense of moral purpose, an understanding of the dynamics of change, an emotional intelligence as they build relationships, commitment to developing and sharing new knowledge, capacity for coherence making (enough coherence on the edge of chaos to still be creative). Fullan, (2002, p. 15). Kozma and Schank (1998 p. 22) noted,

"Teachers must become comfortable letting students move into domains of knowledge where they themselves lack expertise, and they must be able to model their own learning process when they encounter phenomena they do not understand or questions they cannot answer".

Providing Time for Ongoing Professional Development

Renyi (1996) asserted that learning the new roles and ways of teaching that go hand-in-hand with technology integration requires that teachers have opportunities to participate in an extended process of professional development. Teachers need time to acquire technology skills and develop new teaching strategies for integrating technology into the classroom'. Except for occasional in-service programmes, teachers often have no time built into the school day for their own professional development.

Choosing Appropriate Software (or Tool)

One barrier to technology integration is the difficulty many teachers face in finding and using appropriate software for instruction (Glenn, 1997). Teachers at novice or apprenticeship stages of technology integration may need guidance in locating multimedia software and Internet sites to support the school's learning goals, either because they are unfamiliar with these media or because they feel overwhelmed by the profusion of software on the market and sites on the Internet. Lack of time and experience to make good decisions about what particular products or sites have the potential of fostering learning goals and can make technology integration a frightening prospect Glenn added.

Obtaining and Sustaining Funding

Technology implementation...also means obtaining sustained funding for ongoing professional development, technical support, equipment upgrades, and regular maintenance. Funding should be addressed at the beginning stages of technology planning. Consideration should be given not only to initial costs but also to a means of providing a varied and constant source of revenue that will continue into the future.

Funding for technology should not be treated as an add-on but as an individual line item in the school budget. According to Anderson (1996), "A technology plan needs to address the amount of

money that will be required to implement and maintain whatever the plan proposes; how matching money, if necessary, will be sought; how leveraged money might be needed in the future; how finances will be managed; what the contingency plans might be if additional funding is secured or if a shortfall occurs; and how funds will be allocated to pay for the planned obsolescence."

In addition, money for technology can be obtained from private grants, businesses, and federal and state governments. Securing funds for technology in the schools is an ongoing process. Schools need to determine essential components of their technology plan and provide a permanent source of funding for those components.

Incentives for Teachers to Use Technology

Offering incentives is an important aspect of a technology professional development program. Incentives help ensure that teachers who face escalating demands on their limited time receive the training they need to prepare their students for the technological workplace of the future.

Financial incentives are a time-tested method of encouraging teachers to devote their time to professional development. School systems can provide compensation for professional development in technology on weekends or during long vacation [*sic*] (Corcoran, 1995; Monahan, 1996; Speck, 1996). Along with planned professional development, school districts can provide financial support for a menu of approved conferences, workshops, and other professional development activities; teachers can make choices to participate in those activities that most correspond to the specific skills they wish to learn (Tenbusch, 1998; Monahan, 1996). Teachers who master a skill, then present it to colleagues in the building and support those colleagues in learning the skill can be compensated at another level (Poole & Moran, 1998)...Mini-grants can be used to reward teachers who develop innovative uses for classroom technology (Singh & Means, 1994).

Recommendations

To boost Technological education in Senior Secondary Schools, the following recommendations might be worthwhile.

1. Effective and efficient leadership. If leaders are trained in the application of technology, this will enhance their own productivity and that of others. Also, dispensing their duties will be a mere tax, because only a little effort will amount to huge success in the overall school set up.
2. Motivation. Students and teachers can be motivated if needed human and non-human factors are adequately provided taking cognisance of the number of students who enrol into the Senior Secondary Schools each academic session.
3. Research has proved of the great transformation that guidance and counselling will do if given necessary support. The writer therefore, suggests that while some other professions come on air through mass media, counsellors can also do the same, in order to create awareness and possibly take the counselling role to both the low and high rankings of the Nigerian society.
4. Counsellors should ensure that they have enough occupational information before embarking on counselling students into the different technologies
5. Government should ensure a regular funding of schools, since the resultant impact cannot be offset.

Conclusion

The present study has revealed the nature, scope and the relevance of Technological Education in our country, mapped out strategies for its full implementation in schools, based on some quantifiable lapses. Hence, parents, teachers, school administrators, stakeholders and other interest groups should endeavour to 'push up' the inherited traditional Technologies of our land, then the acquired Technology of other nations such as Information Communication Technology (ICT) will be an added effort for continuity and stability of technology influence amongst students in senior Secondary Schools.

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