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QUALITATIVE TECHNOLOGY EDUCATION AND TECHNOLOGY ENTREPRENEURSHIP SKILLS: A NECESSITY FOR NATIONAL DEVELOPMENT

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Abstract
An entrepreneur is someone who has an idea and who works to create a product or services that people buy, as well as an organization to support those efforts. Entrepreneurship is the science and process of creating, establishing, organizing and managing ventures with a view to satisfying human needs and desires, assuming the accompanying financial, psychological and social risks and receiving the resulting rewards of monetary and personal satisfaction and independence. Technology entrepreneurship is a style of business leadership based on the proofs of identifying high potential technology – intensive businesses opportunities, gathering resources such as talents and cash and managing rapid growth using principled, real time decision making skills. Technology entrepreneurship has inclination to technology education skills initiatives in Nigeria, as encapsulated in the National Policy on Education which outlined the goals and objectives of the Nigerian education generally and technology education in particular for sustainable national development. Technology education was introduced as part of the 6-3-3-4 system of education to address or response to outcry among beneficiaries of Nigeria education pertaining to the non-functionality of such educational system. However, owing to poor approach or poor implementation of technology education in terms of absence of standards, quality and performances holistically and simultaneously embraced in the course of implementation, technology education, appears to not have met the required expectation. This paper examines and suggests some instruments of qualitative technology education for national development as well as introduces technology entrepreneurship skills education as part of further innovations in Nigerian educational processes for sustainable national development.

Key Words: Entrepreneurship, Qualitative Technology Education, Technology Entrepreneurship.

Introduction
Education is defined as a systematic activity which leads to enduring change in the behavior of a learner for the purpose of self-actualization of the learner and wellbeing of others and society. Education generally is the process of acquiring knowledge, skills, values, beliefs and habits. It is the process of receiving or giving a systematic instructions especially at schools or university. Its purpose is to broaden understanding that will enable individuals make the best use of their innate abilities and potentials

towards their individual and national development (Enemali, 2010). Accordingly, conscious efforts are made to develop formal learning structure or programme of academic activities for the purpose of general education, training and development of learners and such documents or programme tilt towards curriculum development. Curriculum therefore, refers to organized educational experiences which are planned sequentially and administered to the learner by the school for the benefit of not only the learner but also the development of the society at large (Okoro, Emenyeonu & Akaraonye, 2012).

Curriculum structure is always seen to be drawn based on the philosophy and goals of the affected society, such as Nigeria (Maduka, Njoku & Chiekezie, 2019). This is so because philosophy is a set of definite guiding principles regulating human conduct and human values. Therefore, the philosophy of any educational programme generally expresses the general believe, attitudes, feelings, norms and ideals underlining the establishment of the programme. This is so because the programme's philosophy provides the guiding principles and framework on which the aims and objectives can be evolved. The philosophy of vocational educational are therefore the broad based goal that should be the guiding spirit for implementing vocational education programmes.
Accordingly, the National Policy on Education NPE, (2004) outlined the philosophy and goals of education in Nigeria as a government way of realizing that part of the national goals which can be achieved using education as a tool because no policy on education, however, can be formulated without first identifying the overall philosophy and goals of the nation. This is so because education is an essential part of the society process employed to train the human beings to be functional and to adopt the outlined behavioural pattern by the same society (Akinwale, 2015).

The five national goals of Nigeria which have been endorsed as the necessary foundation for the National Policy on Education are building:

a. A free and democratic society.
b. A just and egalitarian society.
c. A united strong and self-reliant nation.
d. A great and dynamic economy.
e. A land full of bright opportunities for all citizens.

For the philosophy to be in harmony with the Nigerian's national goals, education has to be geared towards self-realization and reliance, better human relationship, individual and national efficiency, effective citizenship, national consciousness, national unity as well as towards social, cultural, economic, political, scientific and technological progress (NPE, 2004).

Literature Review

Concept of Technical Education versus Vocational Education

To actualize these goals, the National Policy on Education anchored their realization to definite innovations. Innovations are new techniques, methods or approaches effectively designed and developed to ensure efficiency and effectiveness in a given setting. One of the innovations adopted to actualize educational goals is the introduction

of vocational and technical education under the current National Policy on Education. At this juncture, the paper examines the conceptual issues in vocational and technical education, as well as the quality, standards and performances in technology education with a view to drawing attention to the extent its objectives have been achieved.
Vocational education is defined as vocational or technical training or re-training which is offered in schools or classes under public supervision and control. It refers to systematic learning experiences which are designed to fit individuals for gainful employment in a recognized occupations as skilled workers or technicians or sub-professionals. It includes guidance and counselling with the training and other instructions directly related to the occupation (Osuala, 2004).

Technical education is the education designed at upper secondary and lower tertiary levels to prepare middle level personnel (technicians, middle level management e.tc.) and at the university level to prepare engineers and technologists for higher management positions. Technical education includes general education, theoretical, scientific and technical studies and related skills training. The proportion of these comportments may vary considering and depending on the type of personnel to be trained and the education level (Osuala, 2004). The term, vocational technical education is a comprehensive term referring to the educational process when it involves, in addition to general education, the study of technologies and related sciences and acquisition of practical skills and knowledge relating to occupations in various sectors of the economic and social life (UNESCO, 2004). The above definitions of vocational education, technical education and vocational technical education tend to pose problems of classifications based on the level of entry level of work, proportious of theoretical end scientific studies and emphasis on practical training. To avoid such debates on classifications and to improve the development in this type of education, the current trend in education and planning and practices is to use a single term "Technology Education" to embrace all such education programmes. The term "technology" deals with the application of knowledge in the solution of practical problem of everyday living. Technology education essentially aims at developing techniques, devices, procedures and the process for doing things. Obviously, theoretical and scientific studies and related skills training are required. These components will vary according to the level of education and career being considered.

The National Policy on Education (NPE, 2004) outlined the aims of technical education as follows:

a. To provide trained manpower in applied science, technology, commerce particularly at sub-professional levels.
b. To provide the technical knowledge and vocational skills necessary for agricultural, industrial, commercial and economic development.
c. To provide people who care apply scientific knowledge to the improvement and solutions for the use and convenience of man.
d. To give introduction to professional studies in engineering and other technologies.
e. To give training and impart the necessary skills leading to the production of craftsman, technicians and other skilled personnel who will be enterprising and

self-reliant.

f. To enable young men and women to have an intelligent understanding of the increasing complexities of technology for over all national development.

With reference to Decree No 16 of 1985 titled (Education, national Minimum Standards and Establishment of Institutions) Decree, section 9 says, among others, the purpose of technical education shall be 9(b) "The provision of technical knowledge and vocational skills necessary for agricultural, industrial, commercial and economic development and 9(e) the provision of technical training to impart the necessary skills leading to the production of craftsmen, technicians, technologists, and engineers and other skilled personnel who will be enterprising and self-reliant for overall national development. Unfortunately, little or nothing has been done to implement the provisions of these sections of the policy and Decree. This is partly because quality, standards and performances were not embraced in the course of the implementation of various policies and aims of education in Nigeria, generally and technology education in particular. This paper therefore, highlights the issue of quality, standards and performances in technology education, examines the introduction of entrepreneur, entrepreneurship and technology entrepreneurship skills as part of innovative ways of further addressing the national underdevelopment challenges.

Standards of technology education are not achieved through the education process, but formulated and stipulated in form of policies, laws, rules, regulations which are presented for the functioning of technology education programmes. Standard of technology education can simply be referred to as prescribed measures for the realization of technology education objectives. Such measures are stipulated inform of policies, rules, regulation, tools, methods and strategies for tests and measurement in respect of technology educational inputs, processes and output, specifications, limits and tolerance prescribed. Prescription with regard to the contents of the curricular of an education system or programme and ofcourse, guidelines and requirements for establishing and running an institution of learning (Lidani, 1995).

Establishment of educational standards takes three stages of programme development. First is the planning stage where educational standards are designed in terms of:

i. Specific needs, values and goals.
ii. Policy guidelines for funding and other physical facilities – types of grants and specifications for physical facilities.
iii. Enrolment of students and admission policies at each level of the programme relative to numbers and admission requirement.
iv. Recruitment of teachers, their levels of qualification and experiences-number and mix for each programme.
v. Recruitment of non-teaching staff, appropriate ratio to teaching staff and students, qualifications and experiences.
vi. Contents and Methods: Depth, breath and length of the programme and strategies for implementation – what, how, when and where.

The second stage is the implementation stage where educational standards are defined and prescribed in terms of: the time allocation and utilization.

i. Policies on students' attendance and other academic activities.
ii. The type and number of tests to be administered at each level of the programme.
iii. Qualifications and other requirements for progression from one level to the other.
iv. The MUST, COULD and SHOULD do or know activities. Policies on continuous assessment, exams rules and regulations and so on. The output stage of educationalSystem is the third level, at which standards are stipulated or prescribed in the form of descriptive or qualitative indices relative to the end results of an educational system or programme. Standards at this level are stipulated or prescribed for the primary purpose of scoring and grading of the academic performance of students in order to determine the specific classes of certificate to be awarded on graduation of students and also to determine the status of a student at the end of each level of the programme.

In terms of quality of education generally and technology education in particular, Beeby (1966) identified the three levels at which qualities of technology education may be thought of: The classroom conception of quality education, which takes into consideration the qualities of education relative to cognitive, affective and psychomotor developments of the learner. The second level is the market place conception of quality education where quality of education is measured by its productivity. By extension, the economists who are more concerned with quality in terms of INPUT and OUTPUT of education system. The third level is where quality education is judged by broader social criteria where each person judges each level of education system in terms of the final goals and values we set for the learner, the market place and the country at large (Lidani, 1995).

A very careful study of each of the above three levels at which quality education are judged will reveal the fact that quality education is generally measured in terms of the extent level/degree to which the education system is able to achieve the philosophical concepts, aims, objectives, goals and values set for a given people, society, community and the country at large (Lidani, 1995). People often talk about quality and standards in education and therefore the contributions of education to national development, without specifying the kind of education, for whom both education and development is intended and at what levels and stages of development and where. This is perhaps the reasons why there is often confusion and problems in assessing the quality of our educational programmes. This is perhaps the reason why standards of education are now in deep trouble with regard to assessing the true qualities, efficiencies and the performance of our education sector relative to the laid down goals, aims, objectives and standards (Lidaru, 1995).

Performance in Technology Education

Standards of education are formulated and stipulated in form of policies, laws, rules, and regulations which are prescribed for the functioning and operations of system of educational progrmmes. They are prescribed measures in terms of the extent to which education system is able to achieve the philosophical concepts, aims, goals and objectives set for a given society. Performance in education refers to the extent to which standards and qualitative education have been achieved such that the products of such quality educational system perform creditably thereby achieving the philosophical concepts, aims, goals and objectives set for a given society (Nigeria) in terms of academic excellence and self employment generation, among others, for overall national development. Therefore, performance in education generally, and technology education in particular, and effective performance of end products (graduates) in the area of academic excellence and self employment generation and technological breakthroughs are critical elements in assessment of the extent to which educational goals have been achieved (Lidani, 1995).

At this juncture, let us narrow down to the goals and objectives of technology education as enshrined in the National policy on Education, NPE (2004) as well as the syllabus of the National Board for Technical Education (NABTEB). This means that the aims/objectives of technology education at this level need to be clarified. Given the required clarifications, the National Policy on Education, NPE (2004) cited the aims/objectives of technology education as earlier enumerated this paper. Pursuant to these provisions, government has advanced precise definitions of minimum standards. Also, specific examples are precise standards prescribed in West African Examination Council (WAEC) in relevant pages of WAEC syllabus as it relates to science and mathematics, among others, at junior and senior secondary schools examinations. “Standards” in this sense, is used to mean, something (indices) used as a basis of measurement and for judging quality or level of excellence aimed at required or achieved (Nnadi, 1996). What is meant here is that educational standards are fixed indices and stipulated in the form of policies, laws, rules and regulations prescribed for the functions and operations of a system or programme. Government has also established certain superintending agencies to ensure compliance with the above mentioned standards – examples National Commission for Colleges of Education (NCCE) for National Certificate in Education (NCE) technical and vocational education, as well as WAEC and NABTEB earlier mentioned above. (Lidani,1995).The existence of these bodies, the clear specification of standard and the fixity of standards as conceptualized, have combined to negate any tendencies for standards to fall in technology education, among others, inspite of the depressing high incidence of instability and other socio-economic upheaval within the Nigerian polity (Lidani, 1995) where the above mentioned tensions have taken a major toll is in the area of poor quality of educational services delivery in Nigeria, which in turn manifested in poor performances of end products (graduates) – (Nnadi, 1996), (Lidani, 1995).

There is certainly, an interface between standards in education on one hand and performances in education and quality of end products of educational process on the other hand. But the distinction between the two is important and must be addressed at

this juncture. According to Nnadi (1996), when a product or output of a system fails to attain the highest limit of prescribed standards it does not mean that the standard of the system is low, or average or poor, but that the quality of operation and operators of the system and overall delivery and implementation processes are low or poor or below standards, leading to poor performances of end products (graduates) as well as imparting negatively to national development. The difference between standards and quality or performances emanates from the fact that standards do not fall or rise, are relatively fixed and valid over a long time period, and provide a framework for uniform practice in a system as well as overall acceptability and marketability of the true product of the particular system/programme. While quality on the other hand can fluctuate up and down easily on account of socio-political, economic and other society upheavals (Nnadi, 1996); thereby negatively affecting performances of end products (graduates) with their attendant negative effects on national development.

In the final analysis, standards of education in Nigeria, has not fallen, the quality of educational delivery and implementation have fallen. The fallen quality of education has negatively imparted on graduates of such system with its attendant negative effect on national development. This is why Ulinfun (1990) lamented the poor quality of technology education in Nigeria. In his paper, titled "Training and development of the technical teachers for national development, he stated that technical teachers lack the usable skills for generation of self-employment.

> *From observations it is obvious that the skill contents of the current technical teacher educational programme is paltry. Trainers tend to pay more attention to methods (Pedagogy) than is paid to matter (skills and knowledge) which is why the technical teacher knows more methods than the skills he is supposed in impart. (Ulinfun, 1990, p. 7).*

According to Nnadi (1996) specific manifestation of inimical effects of poor quality technology education in Nigeria takes the form of certificate racketeering, qualification inflation and the existence of a crop of technologically knowledgeable but indisciplined diplomats and graduates. Therefore, there is urgent need to embrace further innovations in Nigeria education system for national development. Such innovations include qualitative technology educative and technology entrepreneurship.

Qualitative Technology Education for National Development

The measurements in respect of quality education and value judgments relative to education, generally and technology education, in particular confirm in positive terms that educational efficiency and effectiveness for national development must simultaneously embrace standard, quality and performances and also measured in terms of the extent/level/degree to which the education system is able to address and achieve the philosophical concepts, aims, objectives, goals and values set for a given people (Nigeria). In terms of technology education, these philosophical concepts, aims objectives and goals are incapsulated in the National Policy on Education and Degree No. 16 of 1985, among others. While these objectives are get to be achieved, it is the

opinion of this paper that quality, standard and performances in technology education need to be embraced holistically and simultaneously, among others, to achieve a sustainable national development as against the present practices which could be qualified as quantitative educational system.

Accordingly, and in line with above suggestion, qualitative education generally and technology education, in particular should possess the underlisted qualities:

i. Education, generally and technology education in particular are directly related and relevant to the basic needs of the communities, the individuals and the country at large.
ii. Through education, and technology education, every individual is able to contributed in the social, political and economic development of his or her society.
iii. Manpower plans and technology education plans are unique such that human and economic resources wastages are minimized or minimum.
iv. Technology education system's INPUT-OUTPUT measures is able to give rise to productivities, efficiency and effectiveness in all sectors of the economy and society.
v. Education is able to give the nation a status of self-reliance.
vi. The consumers of educational system see certificates, diplomas and degrees awarded by the official authorities and institutions to have the same values and significance.

Technology Entrepreneurship for National Development

As a continuous search for quality education for national development, entrepreneurship education and technology entrepreneurship have been introduced as part of further innovative measures of inculcation of education for national development. First and foremost, an entrepreneur is a person who has the ability to create and build something from almost nothing. It is initiating, doing, achieving and building an enterprise or organization, rather then watching, and analyzing and describing one. The entrepreneur creates business, establishes it, and nurtures it to grow and yield profitability (Timmons, 1994). Entrepreneurship on the other hand, encompasses all the productive functions that are not rewarded immediately by wages, interest, rent and non-routine human labour. It is the function of seeking investment production opportunity, organizing and enterprise to undertake new production process, raising capital, hiring labour, arranging resources and introducing new organization (Haggin's, 1990). Technology entrepreneurship is a style of business leadership based on the process of identifying high potential technology intensive business opportunities, gathering resources such as talents, and cash and managing rapid growth using principled, real-time decision making skills. Attractive business opportunities consists of a great value proposition, technically feasible products, strong intellectual property, a sustainable competitive advantage, a large potential market and proven business model (Byers, 2010). Technology entrepreneurship is a process of industrial innovation and technology transfer, which is relevant for both independent start-ups and within established corporations. Technology entrepreneurship is an investment in a project that assembles and deploys specialized individuals and heterogeneous assets that are

intricately related to advances in scientific and technological knowledge for the purpose of creating and capturing value for the firm.

Technology entrepreneurship according to Tonny (2012) is about:

i. Operating a small business owned by engineers or scientists.
ii. Finding problems or applications for a particular technology.
iii. Launching new ventures, introducing new applications, or exploiting opportunities that rely on scientific and technological knowledge and
iv. Working with others to produce technology change.

Byers earlier definition of technology entrepreneurship was based on ten elements that are put in question forms: Thus:

1. What is the difference between an idea and business opportunities?
2. Why do ventures require dynamic leaders who understand, vision, strategy, risk and tactics?
3. How does contexts (eg economic and political climate) play a role in technology entrepreneurship?
4. What is market positioning? Why are partnership strategies important?
5. What is the purpose of the business plan?
6. Why is cash flow so vital?
7. What are different sources of capital for technology ventures?
8. Why is technology entrepreneurship a team sport? How can reward system and company culture inspire innovation?
9. Why are appropriate sales and business development skills so valuable?
10. What is the role of ethics in technology entrepreneurship? (Onuoha, 2017). The foregoing issues and ideas directly relate to technology entrepreneurship skills needed for sustainable national development. Technology entrepreneurship and technology development go hand in hand in the sense that technology entrepreneurship will always tap into and utilizes opportunities created by technology developments for national development. For instance, the main objective of technology entrepreneurship is the creation and distribution of value by the use of different technological process. These processes include production, manufacturing, processing of products, transportation, transactions and marketing.

Entrepreneurs find themselves in different spheres of commerce, industry, agriculture, technology and so on technology entrepreneurship involves such group of human endeavours as manufacturing, agro-allied ventures, mining, creative and designs, entertainment, music, catering services, logistics, among others. All these ventures cannot be successful without technological development working side by side with technology entrepreneurship experts. Technology entrepreneurship entails projects that search for problems or applications and exploits opportunities that rely on scientific and technical knowledge (Onuoha, 2017). New and emerging technologies are evident in many fields such as information technology, genetic engineering, mano-technology robots, medicine and agriculture. The new information and communication technology has created a lot of entrepreneurial opportunities in the marketing, cloning and

processing of hardware and software. The virtual landscape created by the internet and its associated technologies offers endless opportunities for entrepreneurs. Similarly, the genetic manipulation of micro-organisms for the production of antibiotics, hormones etc. has led to the production improved agricultural crops, animals and so on. This discovery has opened new opportunities for agricultural entrepreneurers. The manipulation of individual atoms and molecules in mano-technology is a key element in most agricultural projects. New technologies include a range of innovations. For instance, in tree crop projects, innovations can take the form of improved cultural practices and equipment, early maturing and high yielding hybreeds and chemical instead of manual weed control (Onuoha, 2017). Technology entrepreneurship taps into the opportunities created by technological development and new technologies.

New technologies that have helped to transform the society included web based mapping tools, mobile technologies and interactive media electronic funds transfer and so on. Each new technology that enters the market has uncontrollable entrepreneurship opportunities accompanying it. Developing countries should imitate the advanced countries to exploit the opportunities created by technologies. Nigeria entrepreneurs should search for ways of improving their goods and services. Nigeria governments, corporate bodies and multinational companies should fund the universities and research institutes to enable them carry out meaningful researches (Onuiha, 2017 P118-119). In the light of the foregoing accounts, issues and established facts, it is clear that entrepreneurship opportunities generally, and technology entrepreneurship, in particular, for sustainable national development are all dependent upon successful technology entrepreneurship skills acquisitions, hence, the urgent need to further embrace the theoretical and practical teaching and learning of technology entrepreneurship skills in our schools and universities.

Conclusion and Recommendations

An entrepreneur is an individual or group of individuals who either untakes the responsibility of making innovations in the economy such as of making introducing new goods, new methods of production or distribution, opening a new market, developing a new source of supply of raw materials or carries out a new organization of any industry. Entrepreneurship is defined as a science and process of creating, establishing, organizing and managing ventures with a view to satisfying human needs and desires. Technology entrepreneurship is a style of business leadership based on the process of identifying high potential technology – intensive business opportunities, gathering resources such as talents and cash and managing rapid growth using principled, real time decision-making skills. The term technology education deals with the application of scientific knowledge in the solution of practical problems of everyday living. Technology education essentially, aims at developing techniques, devices, procedures and the process for doing things. Obviously, theoretical and scientific studies and related skills training are required, these components will vary according to the education and nature of occupation and career being considered. Technology education was introduced as part of the 6-3-3-4 system of education in response to the general outcry among beneficiaries of Nigerian education pertaining the non functionality of such educational programme vis-à-vis the philosophy and goals of the

society. However, the standard, quality and performances of such technology education programme were, perhaps, not holistically and simultaneously embraced on the course of implementation leading to quantitative as against qualitative technology education. As a continuous and innovative efforts to achieve education for sustainable national development, technology entrepreneurship education, which equips the recipients with the necessary technology entrepreneurship skills for national development needed to be adopted to tap into the numerous entrepreneurial opportunities created by technological development and new technologies. Such new technologies include Information and Communication Technology (ITC), genetic engineering, robotic technology, among others.

In line with the opinions articulated in this paper, the underlisted recommendation are made:

1. The six point attributes which quality education or education for self-reliance possess appear to be lacking in Nigeria education, including technology education. There is urgent need to address the gaps to be able to enhance national development.
2. A nation's policy on education is government's way of realizing that part of national goals which can be achieved using education as a tool, unfortunately, education nowadays appear not to be the tools for national development. There is urgent need to address the issues prohibiting education as a tool for national development.
3. There is urgent need for Nigeria education to embrace self-realization, individual and national efficiency and effectiveness, effective citizenship as well as economic, scientific and technological progress.
4. The 6-3-3-4 system of education, and goals and objectives of technology education were introduced as part of innovations to address the challenges of non-functional education, but the quality of implementation of technology education process and performances of end products (graduates) have not met the requirement needed to tackle these challenges for national development.
5. Technology entrepreneurship education and skills acquisitions should be vigorously pursued in the educational system as instrument of national development.
6. There is need to urgently harness the entrepreneurship opportunities created by the advent of new technologies development in the areas of commerce, manufacturing, agro-allied sectors, mining, creative and designs, entertainment, logistics, storage, haulage, medicines, among others.
7. The citizenry should be encouraged by the government and organized private sectors to embrace the opportunities created by emergence of new technologies such as Information and Communications Technology (ICT), genetic engineering and robotics.
8. Conducive political, economic, social, environmental, security, business, emotional and psychological environment should be provided by the government to enable the individuals and organizations embrace the enormous entrepreneurial opportunities created by emergence of new technologies and overall technological development.

9. The leadership, the political and ruling class should desist from the vices of corruption, nepotism, mediocrity, favouritism, political rascality, thugry, inefficiency, incompetency and overall failure of governance.

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