ENGINEERING EDUCATION AND DEVELOPMENT IN NIGERIA BEYOND 2020

By

Dr. Nsikan Okon James
Department of Elect / Elect Engineering Maritime Academy Of Nigeria Oron
P.M.B 1089 Oron, Akwa Ibom State

Dr. Anayo A. Ishiodu
Department of Elect / Elect Engineering Maritime Academy Of Nigeria Oron
P.M.B 1089 Oron, Akwa Ibom State

Ekpeyong O. Ekpeyong
Department of Elect / Elect Engineering Maritime Academy Of Nigeria Oron
P.M.B 1089 Oron, Akwa Ibom State

Abstract

Engineering Education entails education with acquisition of professional skills, theoretical and practical knowledge of the subject matter as well as skills to direct effectively. Engineering Education has experienced setback in Nigeria due to poor funding, lack of functional policy framework , neglects of research findings in engineering, inadequate functional workshop facilities , unstable engineering road map, poor curriculum, decay in educational infrastructure, non-implementation of educational budget. This paper advocated the need for proper examination of Engineering Education programs. If the nation wants to migrate from third world to industrialized nation, strong, reliable and sustainable economic development. To this end the paper recommended that the present curriculum of Engineering Education in the country should be innovated to meet the technological need of Nigerians and proper funding of Engineering Education programs.

Keywords: Engineering Education, National Development Nigeria.

Engineering skills are obtained by attending Technical Institutions, Colleges, Polytechnics, Monotechnics and Universities. Engineering is the key to the technological, economic and societal development of any nation. Drucker (2007) defined Engineering as a way or means of accomplishing a task. Historically, the first Nigerian Engineer to receive formal training attended the Yaba College of Technology in the 1940s, and University of Ibadan in 1948 Nigerians were sponsored to British Universities to train as Engineers. Today, Nigeria witness the establishment of Federal, State and Private Universities with Engineering faculties accredited by National University Commission (NUC). According to Danko (2006), Engineering Education is that type of education in which students learn about the processes and knowledge

related to engineering. Again, as a field of study, it covers the human ability to shape and change the physical world to meet needs by manipulating tools using techniques. Olunwa (2007), observed that any nation that wishes to attain a great height in national development cannot compromise the education of her citizenry.

Historical framework of Engineering Education in Nigeria

Okojie (2007) posited that the Higher Engineering Education Institute was established in 1932 the Yaba College of Technology as the first Higher Education in Nigeria. Again, another two Monotechnics were established in 1977 the Nautical College of Nigeria now Maritime Academy of Nigeria Oron and College of Aviation Technology Kaduna. Nigeria was without a Federal University of Technology until in 1980s when four Federal Universities of Technology were established. They are: Federal University of Technology Minna, Federal University of Technology Akure, Federal University of Technology Yola and Federal University of Technology Owerri. Today, Nigeria is growing in Arithmetic Progression in Engineering Education due to poor perception of Engineering Education. According to Okoro (1999), before British intervention in Nigeria and the establishment of formal educational institutions in the later part of the nineteenth century and the early part of the twentieth century, education in Nigeria was mainly vocational and technological in nature. An important function of education was to teach people how to earn a living by becoming expert producers of goods and services. Young men acquired the rudiments of an occupation from their parents or from their expert craftsmen to whom they were apprenticed. Technology and Vocational Education ensured that foods and services necessary for the survival of the society were produced. Engineering Education also ensured that agricultural skills, building skills, medical knowledge and technical expertise were passed from one generation to another and remained a part of the culture and way of life of the people.

Factors Militating Against Engineering Education in Nigeria

According to Uwaifo (2009), a country is said to have a setback in Engineering Education when the product from Engineering Institutions cannot produce capital goods such as tractors, lathe machine, Electrical and Electronics devices, drilling machines, cars, iron and steel, train and other earth moving equipment as well as being unable to exploit her natural resources except with the help of foreigners who will normally provide the engineering skills and expertise to undertake the exploitation of her natural resources. The problem facing effective technology development can be summed up as follows:

Obsolete Curricula: The major setback that is hindering effective Engineering Education in Nigeria is the issue of curriculum design. Onwuka (2009) asserted that the Engineering Education curriculum in Nigerian Universities can be said to be obsolete and there is need to reshape Engineering Education curriculum to accommodate the current needs of Nigeria Technological Development. The council for the regulation of

engineering in Nigeria has a mandate for accrediting engineering facilities in Nigerian Universities. Though the Council for Regulation of Engineering in Nigeria (COREN) and the Nigerian Society of Engineers (NSE) have been active in this area, but sadly, their efforts have not so far brought any major improvement to the state of Engineering Education.

Students Lack of Exposure to Industrial Practice

According to Olorunfemi and Ashaolu (2012) the major qualities of a good engineer are technical ability, imagination, good teaching method, industry partnership and solid Judgment. They maintained that technical abilities depends on technical knowledge. Sadly Engineering Institutions have not gained the cooperation of industries in the Students Industrial Work Experience Scheme (SIWES). Students find it difficult to get position for industrial attachment.

Problem of Staff Qualification and Experience

Inadequate number of senior lecturers with PhD qualification. Most Engineering Institutions are flooded with lecturers without PhDs and professional memberships. Alabe (2008), asserted that for Engineering Education to take its rightful place in the country government should pay attention to engineering programs by sponsorship through training and retraining of engineering personnel.

(a) Lack of Coordination between Research Institutes and Production enterprise. Most of the discoveries and inventions were never implemented. This was mainly because production enterprises operated independently with little or no exchange of information. Wodi (2012) asserted that there was no clear goals for research and development and no concept of the importance of research and development for purely scientific purposes, skilled workers, Engineers, Scientists, Technicians and Managerial Personnel were in very short supply.

(b) Inadequate Funding of Education: No nation can develop technologically when the formal education sector that drives the technology is not adequately funded. Okoro (2014) maintained that the Federal Government yearly allocation to the Education sector has for over the years been far below average. Ekundayo (2006) submitted that Nigerian government over the years has not been meeting the United Nation Educational Scientific and Cultural Organization (UNESCO) recommendation of the 26% of the total budget Aina (2007); Adeyemi (2011) ; Oseni (2012). They posited that government priority to Education is still very low, the apparent shortage of funds available to Educational Institutions have been responsible for declining library infrastructure and laborarories in recent years.

(c) **Poorly Equipped Laboratories:** The Nation's Technical Colleges, Monotechnics, polytechnics and Universities that are supposed to train proficient Technicians, Technologists and Engineers are now filled with outdated and in most cases non-functional equipment. Sofolohan (2008) contended that shortage of workshops and laboratories in technological institutions hinders the realization of the goals and objectives of technology Education curriculum. Non installation of the important equipment meant for the teaching of technology subjects due to accommodation problems hinders its successful take off and the level of achievement by the student. Laboratory workshops in the technological institutions are becoming non-functional. They are usually not serving the purpose for which they were built. As a result, engineering development is hindered due to poor nature of the learning environment. Workshops and laboratories for Engineering Education Programs should be of high quality since the objective and strength of the programme lie in providing intensive training in a wide variety of workshop situation. A survey of most technological colleges in Nigeria reveals that their workshop accommodation and laboratory are inadequate and thereby creating unconducive teaching and learning environment for both teachers and students. Asele (2010) maintained that gross inadequacy of workshops and classrooms for pedagogic activities, irregular power supply and non- provision of materials for students' psychomotor learning have contributed to low quality of instructions.

(d) Infrastructural Challenges: Wodi (2009) observed that the educational sector is a sub system being influenced by other sectors (such as Energy, financial institutions, politics, and other socio economic factors) that are dysfunctional, then the educational system cannot function in isolation. For example it is impossible for engineering education to function effectively in the absence of stable power supply to operate the various laboratories, machines, power, computer, telecommunication, thermodynamics, soil, water and hydrology where available. Internet services are inadequate in technological institutions.

(e) Discouragement of Technical Education: Technical Education was not taught in school by the colonial masters except by the second half of nineteen century. Akaninwor (2008) observed that the colonialists discouraged further development of Nigerian technology as they reasoned it was a threat to the smooth marketing of goods imported from Europe.

(f) Poorly Equipped Educational Institutions: Nigerian Universities, Polytechnics and Technical Colleges that are supposed to train proficient engineers, technologists and technicians are now filled with obsolete and non-functional equipment.

(g) Colonial Education: The colonial education was general education and grammer to produce clerks and interpreters and no technical nor vocational Education was introduced to Nigerians.

How to Develop Technology Using Educational Tools

Technology can be developed in Nigeria if government should be able to provide appropriate framework that generate interest, and encourage the training of Engineering Technologists in quantity and quality through technology institutions using model of light industries, craftsmen, technicians, technologists and engineers can be gainfully employed to operate at their various levels of competence. Ekhovbiye (2011) posited that industrial market survey by engineering and technologist students should be observed. This is done by copying items already in use in the market for laboratory component analysis for building prototype or similar items to be produced. Again, Technology Education **s**hould be repositioned and fashioned in the same way, same operations, using the same tools and machines in respect of the occupation being prepared in the school system, the training received by students in technical and vocational education should be the same with what they will meet after graduation. Abdurahaman (2013) stated that technical and vocational education is a tool that foster national development when the environment in which the trainee is prepared should resemble the environment he must surely get employed and that means the individual is trained directly and specifically in the thinking and manipulative habits required in the desired occupation.

Another aspect of improving technology is through student Espionage. According to Ekhovbiye (2011) highly technical knowledge are guided by their proprietors, the secrets can only be obtained through Espionage. Technology spies are often used to collect top secrets and company documents required for developing such products, which they pass on to their sponsor.

Furthermore, Umunadi (2012) posited that Energy production and innovation of engineering curriculum are key to national development. Proper energy production will take the country high in the pedestal of technological development beyond 20: 2020. Innovation of the existing technology curriculum with appropriate technology that reflects the culture of the people and meet the technological needs and aspiration of Nigerians. Okereke (2008) stated that for engineering education to take its rightful place in the country government should institutionalize Educational framework and policy for actualization of vision 20: 2020 and beyond.

Lawal (2013) posited that for Nigeria to develop technologically government should use technical and vocational education as a tool for national development.

Engineering Education and Development in Nigeria Beyond 20:2020

Engineering Education in Nigeria has experienced massive growth and development in terms of engineering transfer of knowledge and training of middle man power, highly skilled professionals from technical institutions that form competitive workforce that contribute to national growth and development. Ojimba (2013) observed that technical and vocational education play vital roles in socio-economic and political stability in Nigeria. This is shown in the space development where Nigeria successfully launched her own satellite in the space, far away in China. This satellite can be used to solve her internal problems of security, crime detection, identify criminals, monitor oil pipelines and electric power facilities that are prone to vandalization. At the moment Nigeria is the fastest growing economy in Africa with abundant human and natural resources if only technologists would be patriotic enough to use their skills and creativity to place Nigeria on the economic map of the world beyond the vision 20: 2020.

Conclusion

In conclusion Engineering Education in Nigeria must seek to contribute to the development of Nigeria by maintaining flexibility in the Educational programs and continually adapting them to technological changes. Our programs must provide intensive course work that will give students a solid theoretical backup and research projects that involve the application of modern scientific techniques to practical approach. Engineering Education should therefore be given a priority and engineers should be given opportunity for proper training and certification. Appropriate frameworks for inter and intra engineering transfer should be in place. Engineers should be given National engineering tasks like their counterparts in other professions as well as repositioning Engineering Education for sustainable industrial growth, this will be possible if government will give education proper budgetary allocation, proper funding and implementation of research findings, improve infrastructural facilities, training and retraining of Engineering teachers, equip laboratories and libraries of Engineering institutions. Today nations are reassessing their mosaic of economic strategies for thriving, rather than surviving, in a global economy. At the core of this transformation is increasing deliberation, and consensus among government, business and Higher Education leaders of the need to create and attract a highly skilled and competitive workforce that contributes to national economic infrastructure that is sustainable, renewable and responsive to shifts in global market place. At the forefront of this deliberation is the role of Engineering Education institutions in creating this competitive edge. If the government will be willing to fund Engineering Education and Engineers are patriotic enough to use their skills in creating wealth and improving the economy, then the 20: 2020 and beyond will materialize.

Recommendations

A reappraisal of the traditional approach to Engineering Education in Nigeria to include partnership between Universities and Industries to boast engineering transfer of practical skills knowledge.

The following recommendations are made:

- The present curriculum of engineering education in the country should be innovated to meet the technological need of Nigerians.
- Proper funding and management of graduate internship and skills acquisition programme by Federal Ministry of Science and Technology.
- Policy matters relating to Engineering Education and technological advancement of the nation should be prerogative of nation's indigenous engineering family and should not be left to the politicians.
- Government should equip Technology laboratories with modern equipment to enhance teaching and research in the nation's Universities, Polytechnics and Technical Colleges.
- The Federal Government through National Universities Commission (NUC) and National Board for Technical Education (NBTE) should embark on advocacy to educate the public on the potential role that Engineering Education plays towards national economic development.

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