ABSTRACT

The Nigerian education system started slowly but soundly developing during the colonial time until the conclusion of World War II. The Christian missionaries introduced the western education system in Nigeria in the mid-nineteenth century. Higher Education in Nigeria originated with the Colonial government launching the Yaba Higher College in 1934. The role of technology in industrial and economic development is enormous as it not only prescribes the machines, fabrications, and production processes but is also concerned with the management of the resources and the balancing of the multi-various constraints of the industrial environment: These processes are technological capability which consists of the ability to identify the most relevant techniques for a purpose to acquire it on the best possible terms, and, once acquired to assimilate the technology internally. It also includes the ability to modify the acquired technology so as to adapt it to the specified circumstances of the use. Ultimately, it includes the ability to create innovations from within and to apply these innovations internally as well as market them commercially. Polytechnic education must therefore not be seen in terms of screw drivers and spanners but must be seen as encompassing all fields of applied learning relevant to the needs and development of Nigeria in the areas of knowledge needed in ensuring that resources of all types are efficiently translated into desired products and services.

INTRODUCTION

It is clear in this day and age that there is widespread interest in polytechnics and
monotechnics in both the so-called developed and developing countries. This is exemplified very clearly by the rapid growth of polytechnics and monotechnics in Nigeria (Aderoba, 2010). The policy for higher education in Nigeria is embedded in the National Policy on education, as well as other issues approved from time to time by the National Council on Education (NCE) which is the highest decision-making body of education related matters and other policies legislated and passed into law in respect of higher education operations and management in the country. The policy for higher education in Nigeria is based on what the government approves as the practice to be promoted in Nigeria or what the government of the day legislated within the overall goal of higher education. According to the National Policy on Education, (NCE, 2000) higher education is expected to:

- Contribute to national development through high level relevant manpower training;
- Develop and inculcate proper values for the survival of the individual and society;
- Develop the intellectual capability of individuals to understand and appreciate their local and external environments;
- Acquire both physical and intellectual skills which will enable individuals to be self-reliant and useful members of the society;
- Promote and encourage scholarship and community service;
- Forge and cement national unity
- Promote national and international understanding and interaction.
- Education beyond school such that we will furnish the students with more complicated and fresh knowledge and consequently develop better skills.
- Conducting research which should be speculative and imaginative and accumulate knowledge and ideas for the benefit of society. (Freeman, 2007)

The national policy on education document also specified how these goals shall be pursued by higher educational institutions in Nigeria. These include teaching, research and development, virile staff development, generation and dissemination of knowledge, a variety of modes of programmes including full-time, part-time, block-release, day-release, sandwich, etc, access to training funds such as those provided by the Industrial Training Fund (ITF), Students Industrial Work Experience Scheme (SIWES); maintenance of minimum educational standards through appropriate agencies; inter-institutional cooperation, dedicated service to the community through extra-moral and
Basic Indicies of Technological Development

The following basic indices are used to judge the level of technological development of a country:

- Level of industrial production: automobiles, machines tools, ship building, aircrafts, domestic equipment, materials production, consumer goods, petrochemicals, small, medium and large scale industrialization.

- Level of energy produced and consumed: Hydroelectricity produced and utilized, solar energy development and utilization, nuclear energy development and utilization, bio-energy, petroleum and gas development and uses.

- Level of research and development: New products development and inventions as evidenced from patents, fundamental research and investments on research development.

- Level of information and telecommunication technologies: Telephones, telex and facsimiles, internet services, computers, satellites, radio and television facilities.

- Level of infrastructural and public facilities: general town planning, transport facilities, Health Services, sports and recreational services, post offices and courier services, Agricultural facilities, Roads, Potable water, Sewage and waste disposal. (Adeyemi, 2000)

- Clear unambiguous transparent electoral and democratic transition also determined the level of technological development of a country.

Economic Indices of Development

The above technological indices are usually reflected in economic indices such as Gross Domestic Product (GDP), industrial output index, Industrial capacity utilization, inflation rate, etc. (Adeyemi, 2000) Table 1 summarizes these economic indicators as they relate to Nigeria between years 2007-2011.

Table 1: Selected Economic indicators in Nigeria.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Indicators.</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GDP purchasing power parity</td>
<td>10.6%</td>
<td>5.4%</td>
<td>6.2%</td>
<td>7.0%</td>
<td>8.5%</td>
</tr>
<tr>
<td></td>
<td>(PPP): NGN 65.334 Trillion</td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>GDP growth rate 2009 estimate: US NGN 42.844 Trillion</td>
<td>6%</td>
<td>7%</td>
<td>8.4%</td>
<td>8.4%</td>
<td>6.9%</td>
</tr>
<tr>
<td>3</td>
<td>Inflation rate (%)</td>
<td>N/A</td>
<td>11.6%</td>
<td>12.5%</td>
<td>13.7%</td>
<td>11.1%</td>
</tr>
<tr>
<td>4</td>
<td>Unemployment rate (%)</td>
<td>N/A</td>
<td>10%</td>
<td>10%</td>
<td>15%</td>
<td>28%</td>
</tr>
<tr>
<td>5</td>
<td>Public debt (gross debt as a % of GDP)</td>
<td>12.8%</td>
<td>11.6%</td>
<td>15.2%</td>
<td>16.4%</td>
<td>16.2%</td>
</tr>
<tr>
<td>6</td>
<td>Public deficit (net lending/borrowing as a % of GDP)</td>
<td>-1.3%</td>
<td>-3.5%</td>
<td>-10.3%</td>
<td>-7.9%</td>
<td>-4.3%</td>
</tr>
<tr>
<td>7</td>
<td>Market value of publicly traded shares: Billion</td>
<td>86.35</td>
<td>49.80</td>
<td>33.31</td>
<td>N/A</td>
<td>29.4</td>
</tr>
<tr>
<td>8</td>
<td>Budget deficit ₦ Billion</td>
<td>22.1</td>
<td>35.6</td>
<td>55.9</td>
<td>101.3</td>
<td>81.0</td>
</tr>
<tr>
<td>9</td>
<td>Industrial capacity utilization (%)</td>
<td>39.0</td>
<td>39.4</td>
<td>39.0</td>
<td>36.2</td>
<td>30.4</td>
</tr>
<tr>
<td>10</td>
<td>Industrial output index</td>
<td>162.1</td>
<td>178.4</td>
<td>169.5</td>
<td>162.7</td>
<td>132.8</td>
</tr>
</tbody>
</table>


**Rating of Technological Development In Nigeria**

Nigeria is rated 55th amongst the world’s ranking (IMF, 2011; UNESCO, 2009) despite her abundant natural and human resources. This is based on low Gross National Product (GDP), high unemployment rate, low income per capital, crippling national debt and high inflation rate as seen in Table 1. The over dependence on one product (crude oil) which is subject to vagaries of international markets coupled with unstable political situation in the country continued to make the future more bleak and precarious. The economic indices used by the various world bodies in classifying Nigeria as undeveloped country even tend to underemphasize the near desperate under development of technology in the country. Oil proceeds seem to give a false picture of some prosperity (Akinbinu, 2008).

**The Role of Technology in Nigerian Development**
The 20th century was termed the industrial decade for Africa because the implications of new technologies which became available and their implementation was expected to have considerable impact in up-grading traditional as well as recently transferred technologies (Esther, 2000). Without proper development of technology, Nigeria cannot expect to effectively develop its economy, infrastructures or improve the standard of living of its people. It has been suggested in various quarters that an obvious solution to the nation’s economic and even political problem is through accelerated production of agricultural and industrial goods this can only be possible through the development of solid technological base. The economic, social and political crisis in the country can be traced to the lack of initiatives aimed at developing the technological sector to boost the socio-political economy of the country. (NSE, 2006)

It became clear that in no time the science and technology are likely to form the priorities. In Nigeria this tendency was basically accepted but due to lack of clear policies, competition between administrative, industrial and research organizations and over eagerness to obtain fast solutions for problems and become even more commercially competitive for the time being seem to be a little over ambitious considering the time and proportions of industrial development in the country.

**Technology of the Developed Country**

The recognition of the versatile nature of microorganisms, the mechanization of processes, scale up, serious investment on continuous services, stable infrastructural facilities, well coordinated research plans based on priorities, coordination between research interests and industrial needs and last but not the least, availability of not only qualified but well trained manpower alongside with the fast developing science and technological advances in developed countries soon indicated the inevitable gap, which advanced rapidly in developing countries. In Nigeria the period between 1950-1983 was very promising concerning the development of agricultural food industries (many established and efficiently producing), however due to restrictions arising due to lack of clear policies and subsequent declining economy, the elevation lasted only for a short period. Frantic efforts were made both by scientist and industrialist to cope with the multitude of problems surfacing from raw materials, ingredients and most of all technological know-how etc, shortage and processing problems related to it. By this time Europe and America were represented by innumerable progress in the areas of science and technology (Adeyemi and Balogh, 2006).

**The Polytechnic Graduate**
American, European and Arabian Peninsula have invested in graduates of technologists, technicians, craftsmen and artisans who form the bedrock of any technological development, they are together known as the engineering family. Classification of the various human resources groups in technology is as defined by the Council for the Regulation of Engineering in Nigeria (COREN) (Faluyi, 2003). While one is optimistic it needs to be realized that the engineering family are for the following reasons:

- To serve the comfort of mankind through training and skill acquisition (Institutional training, laboratories, workshops, field studies, basic instructors) industrial training and engagement.

- Up grading the skills of artisans and craftsmen for flexibility and ability to innovate formally.

- Safe functioning of systems (machines/equipments) and its surroundings (environment/society).

- To fulfill these purposes, the salary attraction of graduates have inclined many high school students to take technological courses as their careers in developed countries, we find that the attraction does not parallel their counter parts in the developed countries. However, innovations are meaningless without considering the graduate needs and circumstances as a prior condition to improvement in technology. (JSTS, 2002) Instead of reflecting on the disparity and huge gap between the graduates financial consideration in Nigeria to that of her counter parts in the developed world, Nigeria keeps battling in discrimination of certificate of higher national diploma (HND) to bachelor degree (BSC) in terms of grade level and salary attraction for both.

Curricula

Developments of new curricula and integrated curricula have a very clear impact on science and technology teaching in several advanced polytechnics. Many polytechnics have always strived to introduce new ideas in the form of new courses as the need for them arises e.g. electromechanical technology. There has been a large change in teaching of subjects such as pollution, biotechnology etc. there has also been integration of such fields as information and communication technology (ICT), so the student can visualize a comprehensive idea about a whole system and he realizes that for instance the whole world is a global village and is therefore interrelated. Also new courses are improvised from the old ones and these are helped by very flexible syllabi which allow introduction of changes in a short progress. But if we have a slow mechanism of introducing or deleting course materials, this will most likely hinder rapid progress. (Aderoba, 2000)
Polytechnics should be allowed to run B'Tech, M'Tech and Ph.D rather than converting them into universities. Does that mean that Nigeria does not need Technicians and Technologists again? This is the highest level of insensitivity of the Nigerian government on Technological education. If YabaTech and Kadpoly are qualified to run Degrees, Masters and Ph.D programs they should be allowed to do that as polytechnics rather than robbing national board for technical education (NBTE) to pay national university commission (NUC).

**Overhaul of Technology Curricula**

The curricula of technology programmes need to reflect the real needs and roles in Nigerian society. Presently, technological curricula in the polytechnics and monotechnics are patterned after those of British and American Polytechnics. The British and American graduates have ample, opportunities in their industries to acquire needed skills and experience on the job where as the Nigerian technological environment lacks this. Some provisions made to gain skills within institutions such as industrial training fund (ITF), student industrial work experience scheme (SIWES) are falling apart for the lack of funds and because they have not been accorded the right priority Aderoba, (2000:317).

Staff student relationships are usually advanced in many international polytechnics through student societies which are extra curricula activities. e.g. society for rare animal conservation, friends of the earth etc. these societies serve the dual purpose of training students and connecting them to other interested parties in the society.

The polytechnic teacher in developed countries is always help by a wealth of polytechnic books which are updated almost annually and this is lagging behind in our polytechnics. Further more, science and technology have suffered from a theoretical work which is bombarded to our students through many theoretical hours at the expense of practical laboratory and field work (Sood, 2008)

**Integration**

It is becoming increasingly difficult to teach all basic disciplines in technology separately, this is because there will be no sufficient time to include the accumulated knowledge in the present time in a single curriculum. Aderoba, (2010:105)

Nigerian polytechnics are expected to be centers of higher learning, which should draw students and teachers from various parts of the country and indeed from different parts of the universe. This universal composition is a prelude to cross-fertilization of ideas and culture and culture and learning. At the national level per se, the federal character in the
composition of the polytechnics is expected to enhance national integration. The importance attached to national integration by the federal government is contained in the national policy on education which clearly states that for polytechnics to serve as effective instruments for cementing national unity:

- The quality of instruction in Nigerian polytechnics will be improved with a view to further enhancing objectivity and tolerance.
- Polytechnics development will ensure a more even geographical distribution to provide a fairer spread of higher educational facilities.
- Admission of students and recruitment of staff into polytechnics and other institutions of higher learning will be on a broad national basis.
- Polytechnics will be required to develop teachers’ and students’ exchange programmes to improve both inter-polytechnics’ communication and knowledge of the country.
- Widespread ignorance among Nigerian ethnic groups about themselves will be remedied by instituting a compulsory first-year course in the social organization, customs, culture and history of various people, that is general studies (GS). The award of degrees will be made conditional upon passing of the paper in this course.

Therefore, we must strive to choose curricula that endeavor to advance our students and stimulate them to become useful future citizens. Issues as biotechnology, Agricultural technology, the interaction between human reproduction and potential food resources, the inter-relationships between the environment and the processes within it, pollution technology, energy, power are rarely practically studied. This integrated approach in teaching technological courses should always be under review to include recent trends and evaluate progress achieved and to foresee they would be changes required. It is imperative that technology students should always be acquainted with the common processes and machineries in their area and other integrated topics such as management science, economics, law and social science. These and other issues require special training for teachers and the material from which they select their samples should be most relevant (Moore, 2008).

(Sood, 2008) depicted an integrative form where management aspects and technological education can be tackled together. This is represented in a triangle as follows.

Concepts in technology
Fig 1 technological integrated topics

This clearly reflects the important interrelationships between the various technological disciplines.

Conclusions and Recommendations

Nigeria has made considerable progress in the domain of education. The education system in the country is supervised by both the state and federal. There are 27 federal and state-owned polytechnics in Nigeria. However, much still needs to be done. To improve the standard of Nigeria education we need to have mostly tertiary institution to compete with the world education standard. Although the Polytechnics also have been very hardworking in their own various ability to improve the level of technical education in Nigeria and that Nigeria still need to maintain some technical education to improve the level of technical know-how in the country.

From the discussion of the technological system above, the major constraints militating against technological development in Nigeria are as follows.

- Nigeria is increasingly unable to provide access to especially tertiary education for the critical mass of the population, the few vacancies that exist are oversubscribed with facilities overstretched, and quality is threatened.

- We are aware that no nation has achieved technological and socio–development breakthrough where less than 15 percent of its qualified citizens have access to tertiary education. With less than three percent access, the challenge before us is indeed Herculean.
Unnecessary discrimination between polytechnics and university graduates in job placement and career progressing.

The culpable lack of commitment of the national board for technical education (NBTE) in meeting the needs and demands of polytechnic education in Nigeria.

Inadequate development of technological resources including human, financial, physical and informational

Low level of establishment and poor management of technological products such as industries, service facilities, infrastructural facilities and information systems.

Un-conducive technological environment including socio-economic, technical, political and physical factors.

Low level of development of technological processes which includes technological design and development of technological machineries, equipment, facilities and infrastructures and a sound technological management practice.

Various strategies have been discussed which will remove the above constraints to facilitate rapid technological development in Nigeria.

- The development of technological resources, processes, products and environment must be put on a war footing to ensure effective take-off and growth of the Nigerian economy.

- We need to turn technology into a religion before we can expect to make rapid progress in industrialization. We must adopt strategies and culture that entrenched in every fabric of the Nigerian polytechnics.

- The federal government should consolidate all tertiary institutions. A good number of federal polytechnics and colleges of education be converted to award both degree and non degree courses that will continue to train our middle and higher level of man power necessary for our national survival in a world increasingly driven by knowledge.

- We advocate for a national redemption in education just as all imports should attract a mandatory education tax of one percent.

- Tertiary institution in the country cannot be run without government funding because there are no private individual foundations from which they can draw their funding as obtained in the United States of America.

- Federal government should adequately fund the Nigeria polytechnics and build its
curriculum to run degrees, masters and Ph. D programmes in order to meet the increasing number of candidates.

- That a vote of no confidence is hereby passed on the NBTE and it further calls for the immediate establishment of a National Polytechnics Commission (NPC) to proactively cater for the needs of the sector.

- The capability of Nigeria to adequately empower its citizenry, institution and sustain democratic ideals and principles, diversify and strengthen the national economic and ensure peace and security depends largely on the quality, functionality, responsiveness and competitiveness of its technical education seed.

- The stakeholders in the education sector such as parents, students religious leaders, the press, members of states and national assembly’s to rise to their responsibilities of rescuing the polytechnic education sector from imminent collapse.

The prosecution of technological Development programme in Nigeria should not be treated with laissez faire attitude; it should be put on the same footing as war effort. The road to success in such a programme is full of many constraints and problems. The solution calls for a strong political will which can provide an enabling environment for technology to provide the means, methods and facilities for transforming the nation from its present state of backwardness to a self reliant industrial economy.

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