

# CHAPTER 17

## DEVELOPMENT OF TECHNOLOGY EDUCATION AT TERTIARY INSTITUTIONS IN NIGERIA

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### Introduction

TECHNOLOGY education is an important part of the education of all people. The programme is based on activity oriented instruction which enables students to reinforce abstract concept with concrete experiences. It emphasizes on the "know how" and "ability to do" in carrying out technological work. The American Industrial Arts Association (1985), defined technology education as a comprehensive action-based educational programme that is concerned with technical means, their evolution, utilization and significance with industry, its organisation, personnel, systems, techniques, resources and products and their social/cultural impact. Technology education programme exists at the primary, secondary and tertiary education levels.

The impact of Professor Aliyu Babatunde Fafunwa on education in Nigeria has helped to resolve some national problems and develop the educational system to the present state (Ipaye, 1996). For example, the Fafunwa Study Group of 1984 recommended the establishment of the National Commission for Colleges of Education (NCCE). The study recommended as follows:

*to correct the various anomalies among the Colleges of Education, we strongly recommend the establishment of National Council for Teacher Education that will perform for the large number of colleges of education such functions that*

*the National Board for Technical Education and the National Universities Commission perform for the polytechnics and the universities respectively (FME, 1984:121).*

Two years after this recommendation was made to government, the NCCE was established as a result of the concern for excellence in Nigerian education.

Also, Fafunwa made remarkable contribution to general education at the national and international levels. In order to revive education sector in Nigeria to meet 21<sup>st</sup> century challenges, Fafunwa (2008) suggested the following:

1. Earmark 30 percent of the annual federal budget to education and human capital development;
2. Place greater emphasis on technical education;
3. Adequately fund university and polytechnic libraries, laboratories, classroom facilities and research;
4. Make entrepreneurship and apprenticeship part of the curriculum; and
5. Improve conditions of teachers at all levels: primary, secondary and tertiary (Fafunwa, 2008).

Fafunwa believed strongly in vocational and technical education. He emphasized this from time to time by quoting John Gardner (1961) who expressed Fafunwa's view on this aspect:

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*"A nation that scorns excellence in plumbing because it is a humble activity and tolerates shoddiness in philosophy because it is an exalted activity will neither have good plumbing nor good philosophy, and neither its pipes nor its theories will hold water!" (Fafunwa, 2008; Gardner, 1961).*

Fafunwa was an educator, administrator and successful educationist. He was not a technical man but he knew the importance of technical/technology education. Fafunwa's message to Nigeria as a nation in the 21<sup>st</sup> century was that nothing will be as important as the educated mind, the properly and well technologically trained mind (Ipaye, 1996:4). He believed that education is the key that opens all doors to development.

## **Historical Development of Technology Education In Tertiary Institutions**

Tertiary education is the education given after secondary education in universities, colleges of education, polytechnics and monotechnics. The study of technologies and related sciences are handled in technical, technological and vocational education institutions. Monotechnics are single discipline technological institutions for specialized programmes such as agriculture, fisheries, forestry, surveying, accounting, nursing, mining and petroleum. The structure and statue of their programmes are equivalent to those of polytechnics. These institutions provide the middle-level technical and business manpower for the nation (FRN, 2004; Olaitan & Ali, 1997).

The historical development of these institutions will be addressed under the following sub-headings:

### **Origin of Technology Education in Colleges of Education**

In 1968, the National Technical Teacher Training College (NTTTC) was established in Lagos by the Federal Government. The college is now known as Federal College of Education (Technical), Akoka, Lagos. It was established for the training of technical teachers for technical colleges and technical teachers for pre-vocational subjects in secondary schools. The Federal Government established similar institutions in Gombe, Asaba, Bichi, Omoku, Potiskum, Gusau and Umuze. The Federal College of Education (Technical), Gusau is for female only. These are Federal Colleges of Education (Technical) established for the production of NCE (T) teachers. At present, similar institutions are owned by state government and private bodies.

**Table 1: Approved Colleges of Education in Nigeria**

<b>Categories</b>	<b>Total number in 2013</b>	<b>NCE (T) in 2013</b>	<b>NCE (Special) in 2013</b>
Federal	21	8	1
State	46	3	-
Private	33	-	-

*Source: National Commission for Colleges of Education, 2013.*

The state owned NCE (T) institutions are:

- (1) College of Education (Technical), Lafiagi, Kwara State.
- (2) Enugu State College of Education (Technical), Enugu.
- (3) Abia State College of Education (Technical), Arochukwu, Abia State.

It is important to note that the Federal College of Education in Oyo is for special education (see Table 1).

This analysis will be incomplete without highlighting efforts of Federal Government to get items of equipment for teaching pre-vocational subjects such as woodwork, metalwork, electronics and mechanics. The Federal Government of Nigeria approached some friendly foreign governments for the procurement of workshop equipment. Pre-vocational subject teachers were trained on the use of the equipment through pilot pre-vocational teacher training workshops held in Lagos, Kaduna, Maiduguri and Enugu.

In order to achieve the objectives of the 6-3-3-4 system, the Federal Military Government signed contract agreement with the governments of Bulgaria, Czechoslovakia and Hungary for the supply of JSS equipment (Aminu, 1986). These items were received and distributed to the states. It was expected that the states would have completed workshops for installation of the JSS equipment. This would enable the teachers to handle the *Basic Technology* effectively. Seven thousand, two hundred and fifty four (7,254) units of equipment were received and distributed to the states and federal government institutions and agencies. The total financial implication of the JSS workshop equipment project is N217, 832, 289.76 (FME, 1988; Aminu, 1986).

### **Historical Development of Technology Education in Polytechnics**

The Christian missions took the initiative for providing technical education in the context of formal education in Nigeria. In 1885, the Hope Waddell Institute at Calabar was established by the Baptist Mission for vocational training. In this institute, students learnt trades such as carpentry, printing, book binding, tailoring, baking and brick making. In 1908, Onitsha industrial school was

established by the Church Missionary Society (CMS) for training in building, cabinet making and carpentry (Onabamiro, 1983).

Institutions established by government to train indigenous manpower include the following:

1. Survey School, Oyo was established to train survey assistants. The survey school in Lagos was moved to Ibadan, and then to Oyo.
2. The Marine Department School was established in 1928 to train Assistant Seamen.
3. School of Agriculture at Ibadan and Zaria were established in 1930 to produce Agricultural Assistants.
4. School of Agriculture in VOM, near Jos, was established in 1935 to train Veterinary Assistants.
5. Technical training school for Engineering/Architectural Assistant in Lagos was established in 1931 by Public Works Department.
6. The Post and Telegraph (P & T) school was established in Lagos in 1932 for the training of technicians in Telegraphy and Telecommunication (now known as NITEL Training School, Oshodi).
7. In 1932, the Yaba Higher College was established as the first tertiary education institution in Nigeria. It offered courses in Engineering, Surveying, Agriculture and Forestry, Pharmacy, Medicine and teacher education. Its products were awarded Diploma.
8. The Nigerian Railway Training School was established in Lagos in 1942. (Yakubu, 2001; Omole, 1999; Itedjere, 1997 and Ajeyalemi, 1990).

In 1948, the Yaba College of Technology was established. By 1988, the Yaba College of Technology had produced 18,207 graduates of which 56 percent were in the field of engineering and technology (Headlines, 1988). Specifically, Yaba College of Technology provided courses in Civil, Mechanical and Electrical Engineering, Architectural and Building Technology. (Yakubu, 2001, Thakur & Ezenne, 1980).

In 1960, there were 29 technical institutions with a total enrolment of 5, 087 (Aminu, 1987).

**Table 2: Approved Polytechnics and Monotechnics/Specialized Institutions (2013)**

Category	Polytechnics (Total number in 2013)	Monotechnics (Total number in 2013)
Federal	21	23
State	38	2
Private	19	2
Total	78	27

*Source: National Board for Technical Education, (2013).*

### **Origin of Technology Education in Universities**

In 1948, University College, Ibadan (UCI) was established. Students of Yaba Higher College were absorbed as pioneer students and the university college offered courses in Science, Medicine and Arts. The university started as a college of the University of London for twelve years. In 1962, the University College became an autonomous university.

The Ashby report of 1960 noted that there was the strong bias towards academic subjects which caused lack of respect for manual work and technical education. The Commission made recommendation for strategic development of technical education. Frederick Harbison made a study of Nigeria's high level manpower needs for the period 1960-70. He suggested minimum manpower needs of the period which included graduate teachers, engineers, scientists, doctors, agriculturists and administrators (Fafunwa, 1971; 1994).

The Eastern Regional Government, later taken over by the Federal Government, established the University of Nigeria, Nsukka in 1960, The Federal Government established the University of Lagos in 1962, Ahmadu Bello University, Zaria in 1962, and the University of Ife, Ile-Ife (now Obafemi Awolowo, University) in 1962. It is important to note that University of Nigeria, Nsukka pioneered the production of vocational teachers. It started with 3 years diploma programmes in Industrial Technical and Business Education. The programmes were funded by the Ford Foundation. George W. Ferns and Rex E. Ray from Michigan State University, East Lansing, Michigan, USA were pioneer professors of the programme. Business education was at

Enugu campus of the University where students take business core courses while the professional and technical courses were taught in Nsukka campus. After the civil war, the degree programmes started in four areas namely: (1) Agricultural Education; (2) Industrial Technical Education; (3) Business Education and (4) Home Economics Education, all at Nsukka Campus. But recently, computer education was added to the programmes to produce the much needed teachers of computer for the Nigerian school system.

The Midwest Institute of Technology (M.I.T) was established in 1970. It later changed to the University of Benin, Benin City. In 1975, the Federal Government established Bayero University, Kano; University of Calabar, Calabar; University of Ilorin, Ilorin; University of Jos, Jos; University of Maiduguri, Maiduguri; Usmanu Danfodio University, Sokoto; and University of Port-Harcourt, Port Harcourt (NUC, 2013; Baike & Omoreigie, 1989).

Establishment of universities of technology started with the Rivers State University of Science and Technology, Port Harcourt in 1979. This was followed by the establishment of the following universities:

**Table 3: Approved Federal Universities of Technology**

S/N	Universities	Year
1.	Federal University of Technology, Owerri.	1980
2.	Federal University of Technology, Akure	1981
3.	Modibbo Adama University of Technology, Yola.	1981
4.	Federal University of Technology, Minna	1982
5.	Federal University of Petroleum Resources, Effurun.	2007

It is expected that the universities of Technology will contribute to technological growth in Nigeria. These universities concentrate on technology programmes such as Environmental Science, Agricultural Technology, Bio-Technology and Engineering Technology.

**Table 4: Approved State Universities of Technology**

S/N	Universities	Year
1.	Rivers State University of Science & Technology, Port Harcourt.	1979
2.	Enugu State University of Science & Tech. Enugu	1982
3.	Ladoke Akintola University of Technology, Ogbomoso	1990
4.	Kano University of Science and Technology, Wudil	2000
5.	Cross River University of Technology, Calabar	2004
6.	Ondo State University of Technology, Okiti Pupa	2008
7.	Kebbi State University of Science and Technology, Aliero	2006
8.	The Technical University, Ibadan	2012

**Table 5: Approved Private Universities of Technology**

S/N	Universities	Year
1.	African University of Science and Technology, Abuja	2007
2.	Wesley University of Science and Technology, Ondo	2007
3.	Bells University of Technology, Ota, Ogun State.	2005

Source: National Universities Commission (2013).

### **Challenges of Technology Education**

Challenges of higher education in Africa include under funding, obsolete curriculum, shortage of qualified staff, brain drain, poor deployment of ICT, political instability and failing infrastructure (Jegede, 2011). Willets (2011) enjoined Africa nations to come up with new ideas on how to confront the challenges of higher education, science, research and innovation needed for economic growth.

An investigation of the problems militating against technical education in Nigeria by Yakubu (2001) revealed the following:

- Inadequate science equipment and materials in schools.
- Dearth of teaching aids and materials in schools.
- Shortage of text books and writing materials in science and technical subjects.

- Overcrowded classrooms, infrastructural dilapidation and lack of conducive learning environment.
- Inadequate teachers, instructors and technologists in terms of quality and quantity.
- Inadequate funding of the educational system.
- Poor students' performance in science and technical subjects in class and external examinations.

In another study, Yakubu (2000) identified more problems that affected the quality of technical and vocational education in Nigeria as:

- Local resources are not developed in industrial and agricultural sectors.
- The nation is heavily dependent on importation even for day to day resource requirements in technical and vocational education and;
- Employment opportunities are limited due to inadequate industrial activities.

The National Board for Technical Education (NBTE) has laid down minimum requirement in terms of curriculum, tools/ equipment and training material, teaching and technical/ administrative staff, as well as infrastructural facilities for effective implementation of programmes in polytechnics and monotechnics. Similarly, the National Commission for Colleges of Education (NCCE) has minimum standard to accredit programmes in Colleges of Education (Technical). The National Universities Commission (NUC) performs supervisory and regulatory functions that are identical to those of NBTE and NCCE.

## **Current State of Technology Education at Tertiary Institutions**

The technological trend in the 21<sup>st</sup> century is to capitalize on the Information and Communication Technology (ICT) to enhance the teaching and learning of technology. Policy innovations and changes in the current National Policy on Education include but not limited to the following:

- Introduction of information and communication technology (ICT) into the school system;

- Repositioning science, technical and vocational education in the scheme of national education for optimum performance;
- Establishment of Teachers Registration Council of Nigeria (TRCN); and
- The lifting of the suspension order on Open and Distance Learning (ODL) programmes by government (Federal Republic of Nigeria, 2004:5).

The Technology Education in colleges of education (Technical), polytechnics and universities has started witnessing gradual rise in the number of graduates in technology programmes. The government is improving supply of electrical power for use in industries and schools since a globalised economy requires good ICT and supply of constant electricity to all cities, towns and villages.

While technology education at the College of Education (Technical) is to train technical teachers to handle pre-technical and vocational education, the goals of polytechnics and monotechnics are to:

- (a) provide full-time or part-time courses of instruction and training in engineering, other technologies, applied science, business and management, leading to the production of training manpower.
- (b) provide the technical knowledge and skills necessary for agricultural, industrial, commercial and economic development of Nigeria.
- (c) give training and impart the necessary skills for the production of technicians, technologists and other skilled personnel who shall be enterprising and self-reliant;
- (d) train people who can apply scientific knowledge to solve environmental problems for the convenience of man; and
- (e) give exposure on professional studies in the technologies (FRN, 2004: 41-42).

### **Impact of TET Fund on Technology Education**

Tertiary Education Trust Fund (TET Fund) is now a major source of funding public tertiary institutions in Nigeria. This provides a substantial source of financial assistance to federal, state and local government for commencement, completion or rehabilitation of capital projects embarked upon by public

tertiary institutions. TET Fund earmarked about N42 billion to develop six (6) universities, three (3) polytechnics and three (3) colleges of education into world-class institutions in April 2009 (Bamiro, 2012).

In 2012, the Federal Government allocated N25 billion to tertiary institutions for special High Impact projects. It was directed that the fund should be used for programme upgrade and improvement of the teaching and learning environment of the institutions (Rufai, 2012). Twelve (12) institutions were selected for the 4<sup>th</sup> phase of the special intervention on the principle of one university, and one polytechnic or college of education per geo-political zone. It is important to note that two of the six (6) universities benefiting in the 4<sup>th</sup> phase are Universities of Technology while three (3) polytechnics are Federal Polytechnics. These are:

**Table 6: Technology Institutions benefiting from TET Fund Special Intervention**

<b>Zones</b>	<b>Universities</b>	<b>Polytechnics</b>
South-West		Federal Polytechnic, Ibadan
North West	Kebbi State University of Science and Technology, Aliero	Federal Polytechnic, Kaura-Namoda
North East	Modibbo Adama University of Technology, Yola	
North Central		Federal Polytechnic, Nasarawa

*Source: National Universities Commission, (2012)*

Generally, TET Fund's normal interventions in the tertiary institutions are to be used for the following:

- Construction and rehabilitation of buildings and laboratories.
- Procurement of teaching and research equipment.
- Academic staff training.
- Research and book development.

- Capacity building and teacher training programme.
- Provision of ICT infrastructure.
- Development of facilities that sustain institutions such as boreholes, electric power generators etc (Bamiro, 2012).

### **Internationalisation of Higher Education in Nigeria**

Creation of first-rate higher educational institutions, especially for Polytechnic, Colleges of Education (Technical) and Universities of Technologies require a well funded system with adequate teaching and research facilities. Such institutions would provide the storehouse for the development of human capital required in critical areas of industries, academia and even government since they help those in authority to make better decisions. There is interdependency in the world of work. Workers who produce services and those who produce goods are dependent on each other. In the same vein, *globalization* makes it possible for different cultures and economic systems around the world to be connected and similar to each other. These facts buttressed the point of Okojie (2012) that tertiary institutions in Nigeria need to incorporate new dimensions of international policies and culture into teaching and research towards the production of high-level manpower with relevant skills to meet the demands of a globalised world.

There is the need therefore to strengthen technology education in Nigeria, work on our technology development, strengthen libraries and computer centres, enhance student – learning outcomes, skills and competencies. At present, there is a Working Group on Internationalisation of Education in Nigeria (WG-IEN). The Terms of Reference of the Working Group includes the following:

1. To facilitate the formation and operation of a network, nurtured and supported by National Universities Commission.
2. To promote capacity building and skill development activities for key personnel in Nigerian universities responsible for international offices/programmes on issues regarding internationalisation of education.
3. To promote and facilitate research and internalisation; and
4. To handle all issues concerning internationalisation of higher education in Nigeria (Okojie, 2012:7).

Effective implementation of this agenda will make Nigerian tertiary institutions respond effectively to the challenges of knowledge – driven economy. The poor and unpleasant state of affairs in our higher education system was recently captured by the 2012 Nigerian Universities Need Assessment Report. It is expected that Academic Unions of tertiary institutions will not go on national strike if the Federal Government fully implements agreement signed with staff unions.

Jamil (2009) cited in Bamiro (2012) identified the attributes of world-class universities as:

- Highly qualified faculty.
- Excellence in research
- Quality teaching
- High levels of governance and non-government sources of funding.
- Academic freedom.
- Well-defined autonomous governance structures.
- Well-equipped facilities for teaching, research, administration and student life.
- International reputation of the university.
- University's contribution to society.

### **The Way Forward**

The future of technology education is bright in Nigeria if we take a right step in the right direction. The identified challenges facing technology education must be addressed so that we can move away from being a perpetual consumer of technology, and become active in contributing to the pool of technological knowledge and skills. Specifically, the way forward should include the following:

1. Government should see education as its priority and spend at least 26% of her annual budget on education as recommended by UNESCO. Hong Kong is a regional higher education hub because education is the government's single biggest spending priority (Yam-Keun, 2011). The *Four Asian Tigers* (the economies of Hong Kong, Taiwan, South Korea and Singapore) should be of interest to developmental economy like Nigeria in that they were able to move from *third world* to *first world* in a few decades and were able to progress faster than other

- developing areas, particularly *Latin America* and *Sub-Saharan Africa*.
2. Solicit for support of graduates of tertiary institutions who are in important positions to *give back* to help their institutions. Similarly, tertiary institutions should make clear contribution to the society, speak to and show concern on environmental issues, human rights, political process and urbanization to mention a few. (Fanton, 2012; Akinseinde, 1995).
  3. Periodic review of tertiary institution curricula to ensure that the knowledge/skills being imparted is commensurate with the needs of the nation.
  4. Government and administrators should ensure stability of academic calendar by having harmonious relationship with unions, and implementing all outstanding agreements.
  5. There is the need to organize the institution as a centre for academic excellence with bias towards research and training.

## **Conclusion**

Approved higher education institutions in Nigeria comprise at present 129 universities (40 Federal, 39 State, and 50 Private); 78 polytechnics; 27 monotechnics and specialized institutions; and 100 Colleges of Education (NUC, 2013, NBTE, 2013, NCCE, 2013).

At present, the Federal Government is reinvigorating tertiary institutions by systematically upgrading its infrastructural and institutional facilities (Rufai; 2012). While more funds are required to improve the facilities in the institutions, it is equally necessary that there is value for government's huge investment in education.

Higher education institutions need quality teaching, learning and research. Our needs should emphasize the application of modern information and communication technologies, entrepreneurship, and vocational competencies in both formal and informal sectors of the economy. The progress we have made so far is good but we still have a long way to go when we compare technology education in Nigeria with those of developed countries. The

challenge is, have we met the dreams of Fafunwa for Nigeria education?

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