DOCUMENT RESUME

ED 399 360 CE 072 405

TITLE	Technical Education in Nigeria: The Way Forward. Summary of Proceedings of the Workshop on Technical Education: A Foundation for a Healthy Economy (Ota, Ogun State of Nigeria, March 1-2, 1994).
INSTITUTION	Ministry of Education and Youth Development, Lagos (Nigeria).; United Nations Educational, Scientific, and Cultural Organization, Paris (France).
PUB DATE	Mar 94
NOTE	83p.; Product of UNEVOC, the International Project on Technical and Vocational Education. Sponsored by Dornier International Logistics.
PUB TYPE	Collected Works - Conference Proceedings (021) -- Viewpoints (Opinion/Position Papers, Essays, etc.) (120)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	Comparative Analysis; Economic Development; *Educational Needs; *Educational Objectives; *Educational Practices; Foreign Countries; Government School Relationship; Industrial Training; International Educational Exchange; Job Training; Labor Force Development; Private Sector; *School Business Relationship; *Technical Education; *Technological Advancement; Vocational Education; Workshops
IDENTIFIERS	Germany; Great Britain; Japan; *Nigeria; United States

ABSTRACT

This summary of proceedings includes papers from and about a workshop on technical education in Nigeria and the lessons Nigeria may gain by examining the vocational and technical education systems of Germany, the United States, Great Britain, and Japan. The following papers are included: "Foreword" (Iyorchia Ayu); "Introduction: A Time for Action in Technical Education"; "Why We Sponsored the Workshop" (Klaus Bauer); "Importance of Technical Education" (Iyorchia Ayu); "Technology for Industrial Advancement" (Daniel O. Akintonde); "Technical Education in Nigeria" (P. E. O. Towe mni); "Contribution by the Representative of the National Association of Technological Engineers" (Abimbola Daniyan); "Excerpts from Paper Submitted to the Workshop by the National Association of Technological Engineers: Alternative Proposal for the Three Existing Parallel Routes"; "German Vocational Training in the Dual System" (Richard von Bardeleben); "Content and Process of the Dual System" (representative of the German company FESTO); "Contribution of Industrial Training Fund (ITF)" (Alhaji Usman Mohammed); "International Spread of the Dual System"; "Vocational and Technical Education in USA, Great Britain, and Japan: Lessons for Nigeria" (S. O. Olaitan); "UNESCO's Contributions to the Development of Technical and Vocational System: The UNEVOC Project (International Project on Technical and Vocational Education)" (Hans Kronner); "Implementation of Manpower Training Programme in Private Industries" (E. O. Ugwu); "Implementation of Manpower Training Programme in Governmental Organizations (An Example of Dornier Training Support to the Nigerian Navy)" (M. O. Bakare); "Implementation of Manpower Training Programme by Governmental Organisations"; and "Technical Education--The Way Forward." Concluding the proceedings are a summary of workshop observations and recommendations and lists of workshop participants and official reporters. (MN)

Dornier
Deutsche Aerospace

Technical Education in Nigeria:

The Way Forward

Summary of Proceedings of the Workshop on Technical Education A Foundation for a Healthy Economy

Held at
Gateway Hotel, Ota, Ogun State of Nigeria
1st and 2nd March 1994

Organised by the
Federal Ministry of Education and Youth Development
in collaboration with
UNESCO through the UNEVOC Project and
Dornier International Logistics of Germany

Sponsored by:
Dornier International Logistics

Technical Education in Nigeria:
The Way Forward

CONTENTS

Page

Foreward ---------- 3

Introduction ---------- 4

Addresses

a. **Why We Sponsored the Workshop**
By Dr Klaus Bauer, Dornier International Logistics ---------- 7

b. **Importance of Technical Education**
By the Honourable Minister of Education and Youth Development Dr Iyorchia Ayu ---- 9

c. **Technology for Industrial Advancement**
By the Ogun State Military Administrator, Lieutenant-Colonel Daniel O Akintonde
Represented by Ogun State Commissioner for Education. ---------- 11

Technical Education in Nigeria
By P E O Towe mni ---------- 13

Contribution by the Representative of the National Association of Technological Engineers
Mr Abimbola Daniyan. ---------- 32

Excerpts from paper submitted to the Workshop by the National Association of Technological Engineers ---------- 37

German Vocational Training in the Dual System
By Richard von Bardeleben ---------- 45

Content and Process of the Dual System ---------- 48

Contribution of Industrial Training Fund (ITF)

By Alhaji Usman Mohammed ---------- 50

International Spread of the Dual System ---------- 51

Vocational and Technical Education in USA, Great Britain and Japan: Lessons for Nigeria

By Professor S O Olaitan ---------- 52

UNESCO's Contributions to the Development of Technical and Vocational Education System: The UNEVOC Project

By Hans Kroenner ---------- 57

Implementation of Manpower Training Programmed in Private Industries ---------- 67

a. Mercedes-Benz ANAMMCO Limited and
b. Volkswagen of Nigeria Limited

Implementation of Manpower Training Programme in Governmental Organisations (Executed by Private Organisations like Dornier - Example from the Nigerian Navy) ---------- 69

Implementation of Manpower Training Programme by Governmental Organisations ---------- 70

Technical Education - The Way Forward ---------- 72

Summary of Observations and Recommendations ---------- 77

Foreword

The theme of the Workshop "Technical Education, the Foundation for a Healthy Economy" is very appropriate at this time when the economy of the country needs a boost.

This workshop has made a tremendous contribution to Nigeria's continuous effort to improve the economy by addressing the methods of producing better qualified technical personnel and consequently improve the quality and quantity of available manpower. The workshop addressed the issue of technical education from the craftsman through vocational education to the production of middle level technicians and technologists.

The Federal Ministry of Education & Youth Development is grateful to Dornier International Logistics for initiating and sponsoring the Workshop. We hope that Dornier International Logistics and the Education Sector in Nigeria will continue to be partners in progress.

Dr. Iyorchia Ayu,
Honourable Minister of Education

Introduction

A time for Action in Technical Education.

For two days, 1st and 2nd March, 1994, the searchlight was focused on **"Technical Education in Nigeria"** at the Workshop held at Gateway Hotel, Ota, Ogun State of Nigeria.

Technical Education in the country was put on the workbench; all its bolts and nuts were taken apart to diagnose where faults were: in the system itself or in its operations? Technical and vocational education in Nigeria was also put in the context of what is going on in different parts of the world.

It was a gathering of who is who. There were rectors of polytechnics and a few monotechnics, principals of technical colleges, proprietors of private vocational training centres, directors and other officials of Federal and State ministries of education. Participants also included technical and vocational academic experts from the universities.

Also at the Workshop were a few representatives of the Armed Forces, especially the Air Force and the Navy which have got some modern training facilities through cooperation with DORNIER INTERNATIONAL LOGISTICS of Germany.

Vocational training managers also came from the private sector, notably Mercedes-Benz ANAMMCO and Volkswagen of Nigeria, to enrich the Workshop about their training experience.

Although the Workshop did not carry the international tag, it was indeed an "international" gathering, as experts came from UNESCO under its UNEVOC Project; from Federal Institute for Vocation Education of Germany (BIBB); from FESTO, a German company with long experience in industrial automation and training; and from DORNIER INTERNATIONAL LOGISTICS.

The Workshop was originally the brainchild of DORNIER INTERNATIONAL LOGISTICS, which, from 30 years of operations in Nigeria in the field of specialised technical training and aircraft manufacturing had found that Nigeria has a huge reserve of manpower resources, but which remained, sadly, inadequately or inappropriately trained in the technical fields. DORNIER reckoned that unless the Nigerian huge manpower resources are well-trained, the national objective of raising the industrial production capability of the country could be frustrated.

DORNIER took the idea of organising the Workshop to the Federal Ministry of Education and Youth Development which agreed to co-host the gathering with the company and UNESCO.

The theme of the Workshop, **"Technical Education - the Foundation for a Healthy Economy"** - was very apt. In the spirit of that theme, the first paper by Mr P E O Towe, Director of Programmes, National Board for Technical Education (NBTE), Kaduna, emphasised the direct relationship between technical education and the health of the economy when he said that technical education is the foundation of the economy because it produces the most important resource; that is

> technical manpower required for the exploitation and processing of mineral and other natural resources, for agricultural production and for the manufacture of goods from raw materials which can replace imported ones, create job opportunities and curtail or eliminate demands for foreign exchange. The manufactured goods can also be exported to earn the nation foreign exchange and either eliminate or reduce to the barest minimum the balance of payment or debts owed to other nations.
>
> Technical manpower also maintains and service capital goods and promote research and development (R&D) activities necessary to absorb the sophisticated technologies that are imported at great cost through the purchase of manufacturing and processing plants.

In addition to the papers presented, there was an impressive standing exhibition showing the use of modern technology in technical training at the venue of the Workshop. There was also a visit to the Ogun State Polytechnic, Abeokuta, where participants saw examples of modern training workshops and training aids at the Electrical and Electronics Department that was built and equipped by DORNIER INTERNATIONAL LOGISTICS.

The standing exhibition at the venue of the Workshop include:

a. BITE (Built in Test Equipment) Emulator
   This is a computer based training aid, for the training of maintenance personnel.
b. Maintenance Rack (Radar)
   This is a comprehensive training device for maintenance personnel on radar principles and applied techniques. The Maintenance Rack (Radar) represents the advancement of technical training after classroom instruction, leading to self confidence in the use of technical document tools and instruments as necessary for professional maintenance.
c. Maintenance Rack (Electronics)
   This is a training device for maintenance personnel on electrical and electronics component and circuitry.
d. Modular Production System
   This is a production robot machine.

e. Cassy Computer assisted Science System
This is a measuring and evaluation system for physics, chemistry, biology and electrical/electronic engineering.

f. Leybold Didactic
This is a vero board for advance training system.

g. Antemna Technology
This is used for Antemna measurement.

h. Festo Didactic
A vero board for the design of various electronic gadgets.

i. Unit Train
The modular training system.

j. Technology Training Packages
This contains a variety of electronics components and packages.

At the end of the Workshop, there was a consensus that the state of technical education in Nigeria is most unsatisfactory. Some participants believed that technical education had reached a point of crisis.

Speakers after speakers spoke with passion, gusto and deep concern about the need to mount a crusade to alert the government and people of Nigeria, especially those in position of authority, that technical education is the key to our economic survival.

When it came to concrete suggestions about the steps to take to ensure a change for the better, there were two broad views - those who advocated for a total, root-and-branch reform of our technical education system, and those who think that the country has got a good structure in accordance with the National Education Policy.

The second group believes that all the Federal and State Governments as well as private industry and the community should do is to show more positive attitude to technical education. They also argue that all concerned, governments, private industries, trade union, community leaders should make contributions towards implementing the system we already have.

At the end of the Workshop, one point that was beyond any argument is that there is a crisis in technical education in Nigeria and that the country should ACT NOW.

This publication presents a summary of the proceedings of the two-day stimulating Workshop including many suggestions about the WAY FORWARD.

Why We Sponsored the Workshop

Welcome Address by Dr Klaus Bauer, Dornier International Logistics

We believe we should explain why and how Dornier has come in here as a co-host and sponsor of the Workshop. We did not get involved in this Workshop by chance or guesswork but as a result of our experience and insight in the course of three decades of our operations in Nigeria.

In short, we at Dornier have found ourselves on both ends of technical training in Nigeria. We are trainers as well as users of the trained personnel. For almost 30 years now, Dornier has helped different organisations in Nigeria to establish technical training at all levels, from apprentice and vocational training up to technical application training for degree holders. We started with the Nigerian Air Force back in 1965. Since 1982, we have been assisting the Nigerian Navy in various aspects of manpower training. In other words, we have helped military and civil customers to establish training facilities in Nigeria which are not only outstanding in their infrastructure but also in their training results.

The experience of Dornier in Nigeria goes beyond technical training support for our customers. Dornier, being basically an aircraft manufacturer, founded the AIEP (Aeronautical Industrical Engineering and Project Management Co. Ltd.), an affiliate company for aircraft service and maintenance. With the invention of the Air Beetle - the primary trainer aircraft for the Nigerian Air Force, the first aircraft ever built in Nigeria, handed over to the Nigerian Air Force on January 27th, 1994 - AIEP is also a production company in Nigeria.

Thus, Dornier is not only a partner in training in Nigeria, but increasingly also a user of technically trained personnel on the fairly high technology level of aircraft manufacturing. In other words, we have a very practical reason to be a partner as well as the organizer and sponsor of this workshop.

For our affiliate AIEP we need highly trained personnel which cannot be produced in an isolated environment. The technical training level throughout Nigeria has to create an industrial environment, which the manufacturers confidently can rely on in their needs for qualified and skilled manpower.

No manufacturer can compete successfully on the world market if he continuously has to train and re-train staff which he always loses to competitors. This is because competing manufacturers will always attract his well-trained staff with better offers since there are no government-owned or state controlled technical training institutes with a big pool of technical manpower from where every manufacturer could draw suitable, well-trained staff. Also not every manufacturer can find it economically reasonable to have his own training school.

The result is that there are always raiders or snatchers of well-trained staff; and the vicious circle continues. Other countries have solved this problem through a meeting of minds between the government and the private sector to create a large pool of skilled manpower for every manufacturer to draw from. Nigeria, a country with a population of almost 100 million dynamic and enterprising people, has a big asset in this respect. The missing link is an appropriate system of technical education for industrial development.

I strongly believe that during this Workshop we also have to answer the question why a number of countries in Eastern Asia - with situations very similar to Nigeria - have done so well in their economy over the years.

We of the Dornier company are of the opinion, based on the general experience in industry and commerce in Germany, that a solid and well-established but also well-funded technical training system should be set up and executed in close co-operation between governmental institutions and the industry. We believe this is the foundation of the joint efforts in a country to build up a healthy economy.

We hope that this Workshop will make a contribution to Nigeria's continuous efforts to improve the economy by means of better qualified technical manpower resources which will encourage present manufacturers to produce more with better quality and attract foreign investors to make use of the qualified but less expensive manpower in Nigeria rather than in other parts of the world.

As you will understand, this welcome address can only highlight areas of concern. We believe that the Workshop is a very competent forum to elaborate on the various aspects of the need for highly qualified technical training and the prerequisites to be fulfilled.

We also believe that the present administration has identified the need for a solid technical education within Nigeria, the main emphasis of which is to be placed on the middle level education.

Importance of Technical Education

Keynote Address by Honourable Minister of Education and Youth Development, Dr Iyorchia Ayu

This Workshop is a very important event as it produces a very unique forum for exhaustive discussion of the critical issues of the role of technical education for a healthy economy.

The Workshop will also provide us the opportunity to re-evaluate our efforts in technical education delivery in this country. Technical education emerged from the desire to satisfy national manpower requirements as dictated by the needs of industry and commerce. The discipline is concerned with the production of human capital, an essential ingredient for industrial break- through and growth.

In recognition of this fact, the Federal Government during the third national development plan period embarked on the establishment of new technical institutions and the expansion of the existing ones. Eight new Federal Technical Institutions were then established. The number of Federal Polytechnics increased from one in 1970 to 17 in 1994, while Federal Technical Colleges rose from one in 1990 to 11 in 1994.

Not too long ago, state polytechnics were granted matching grants to enable them expand their facilities. Recently also, the Federal Government decreed that all registered companies operating in Nigeria shall pay 2% of their pre-tax profit as education tax.

The proceed is expected to be invested in the expansion of facilities in our educational institution which include technical institutions. However experience has shown that a lot still has to be done especially in increasing training facilities for the production of craftsmen, technicians and higher technical manpower.

The theme of the workshop: **"Technical Education, a Foundation for a Healthy Economy"**, is very timely. It is therefore my hope that the conference, whose participants include policy makers and managers of technical institutions shall confront the critical issues of technical manpower production in Nigeria.

Constraints of technical institutions

Some of the problems identified as plaguing our technical and technological institutions range from inadequate infrastructural facilities, to lack of equipment, machines and consumables required for practical work. These deficiencies prevent many of our polytechnics from gaining full accreditation status for most of their engineering and science-based programmes.

Expectations of the Federal Government on Technical Institutions

Let me share with you some of the expectations of the Federal Government on the role of Technical Institutions in Nigeria. The technical institutions have a primary role or producing a wide variety of lower, middle-level and high level technical manpower to guarantee a technological base for the 21st century in Nigeria. To this end, the technical institutions are expected to liaise with the industries to ensure currency and relevance of their curricula. The institutions are also expected to introduce new courses in response to the socio-economic needs of the nation.

Technical Institutions in Nigeria are definitely doing their best in the difficult circumstances but they still need to improve the quality of their products and also venture into applied research. They are expected to set up research units that will link up with industry to translate into useful and marketable products.

Technology for Industrial Advancement

Address by the Ogun State Military Administrator, Lieutenant-Colonel Daniel O Akintonde, Represented by Ogun State Commissioner for Education

Our unpleasant experience of over a decade ought to teach us the inescapable reality of embracing technology. The slide in our national economy has brought in its trail an excruciating recession which in turn has adversely affected the standard of living of our people.

The situation, no doubt, has been compounded by our dependence on importation for most of our industrial inputs and consumption needs. Consequently, many essential industries have been forced to close-down or work far below capacity. We have now realised more than ever before the necessity to harness our natural endowment and tap our potentials to the fullest in order to make Nigeria a place worth living. We have also painfully learnt that for a nation to be self-reliant, there must be technological advancement.

In this connection, I wish to observe that this workshop/exhibition is being organised at a most auspicious time to reawaken us to the stark fact that it is imperative for us to develop our indigenous technology if we must survive. Some people have even talked of "technology transfer" as a way out.

The fact of the case, however, is that one may borrow or get transferred to oneself the wrong thing if one lacks the sound scientific and technological training to be able to understand, analyse and synthesize what is being borrowed or transferred in order to derive maximum benefits. The realities of the present day industrial advancement make the transfer of technology unachievable.

No inventor will allow anyone who has no stake in his business to reap the gains. In this regard, one cannot blame the industrially developed countries for jealously guarding their trade secrets by refusing to hand over to us the technical know-how required for the production of finished products on which their own economies depend. It is therefore abundantly clear that our salvation, in the present context, lies in our hands and not in the benevolence or magnanimity of foreign powers.

They can be of assistance to us if only we are prepared to seize the initiative, adopt the right attitude, and enunciate and implement the relevant policies to redeem the situation What we now need is an aggressive research in selecting, acquiring, adapting, developing and maintaining technologies relevant to our needs and the realities of our economic situation.

It is on this score that I wish to implore all training institutions to complement the effort of the present Military Administration which is consistently creating the enabling environment for technological development with a view to making life more meaningful to all Nigerians. Ogun State Government on its own part is always prepared to encourage the development of Science and Technology in its institutions. To this end, a sum of N26 million has been earmarked in our current budget for the provision of infrastructure and equipment in the various institutions of higher learning in the State.

By the same token, a substantial sum of money has been allocated for the accreditation exercise of the seven technical colleges and the construction and equipping of science laboratories in secondary schools in the State.

The benefits of an exhibition of this nature are many. While it exposes the participants to the latest in technologies, it creates at the same time an avenue for the organisers to advertise their products. Also, it provides a suitable forum for meaningful interaction between the various organisations and individuals involved in the promotion of technology. I wish to implore participants, therefore, to ensure that they derive maximum benefits from the exposure offered by this workshop/exhibition to improve and acquaint themselves with the most recent techniques in technological development around the world and thereby improve their skills which is a condition precedent to the much-talked about technological take-off.

Technical Education in Nigeria

By Mr P E O Towe mni

Introduction

The theme of the workshop - **"Technical Education, a Foundation for a Healthy Economy"** is very well thought out by the organisers. It shows foresight on their part, reflecting on the issues of the moment as technical education should relate to the economy. Today most Nigerians and the Government are worried about the state of the economy. It therefore does not need to be over-emphasised that all hands should be on deck addressing the issue. So, it is hoped that through this workshop participants may be reminded of the crucial roles technical education is expected to play in the economy and perhaps take advantage of the opinion of industry and technical educators present to map out new strategies or review existing ones on how to effectively play theses roles. I therefore congratulate the organisers for a job well done.

The general theme of this workshop raises two basic questions which I believe need clarification:

a. What is a healthy economy? and
b. How does technical education become its foundation?

From the definition by Witty (1992:98) of 'healthy' as a state of being well in mind and body, free from illness, it may be deduced that a healthy economy may be one that is buoyant, where most citizens are assured of the good life and by implication, their basic needs - food, regular drinking water and power supplies, shelter, clothing, communication, full employment as well as personal and national security. And technical education may be the foundation of a healthy economy, because, it produces the most important resource, that is, technical manpower required for the exploitation and processing of mineral and other natural resources, for agricultural production and for the manufacture of goods from raw materials which can replace imported ones, create job opportunities and curtail or eliminate demand for foreign exchange. The manufactured goods can also be exported to earn the nation foreign exchange and either eliminate or reduce to the barest minimum, the balance of payment or debts owed to other nations. Technical manpower also maintains and service capital goods and promote research and development (R & D) activities necessary to absorb the sophisticated technologies that are imported at great cost through the purchases of manufacturing and processing plants.

This paper addresses the sub-theme **"Technical Education in Nigeria"**. In it participants will be reminded of the current structure of technical education in Nigeria; discuss if the objectives of technical education are being achieved, technical education offered in the polytechnics and technical colleges, their problems and the future of technical education in Nigeria.

The Structure of Technical Education in Nigeria

One of the aims of education in Nigeria is that it should lead to "the acquisition of appropriate skills, abilities and competences both mental and physical as equipment for the individual to live in and contribute to the development of the Nigerian Society (Fed. Gov. 1981). The structure of the educational system - see appendix 1 - shows clearly that at each level of education, those not continuing must go to the employment market. So all levels of education contribute to the acquisition of these skills and competences in one form or the other. Hence, at primary and secondary levels, technical education which is given in the form of craft work, practical agriculture, introductory technology, integrated business studies is pre-vocational in nature, mainly introduces the youngster to the world of work, to appreciate the dignity of labour and the basic production processes.

In technical colleges and tertiary institutions such as polytechnics, monotechnics and universities, technical education is vocationally oriented; in addition to general education, it provides both the scientific knowledge and practical skills required for a trade, employment or profession as artisan, craftsman, technician, technologist, engineer, scientist, et-cetera and similar levels in business in the fields of engineering, agriculture and other applied sciences and business (Fed. Govt. 1985).

Table 1 shows the structure of technical education in Nigeria which indicates the levels of training, the type of technical manpower they produce, the minimum entry requirements and the approved terminal qualifications.

In the non-formal sector, a lot of vocational training is taking place. The roadside apprenticeship schemes that have produced most of the artisans in the economy still flourish. Various organisations, like the motor vehicle assembly plants have their own apprenticeship

TABLE 1 - STRUCTURE OF TECHNICAL EDUCATION IN NIGERIA

Name of Institution	Category of Manpower Produced	Terminal National Qualification	Minimum Entry Requirements	Remark
1. Primary School	Pre-Vocational	Primary School Leaving Certificate (PSLC)	None	
2. Vocational Schools	Artisans	Fed. Min. of Labour Trade Test Certificates	P.S.L.C & JSSC and aged 14 and above.	
3. a. Secondary - Junior	Pre-Vocational	Junior Secondary School Certificate (JSSC).	P. S. L. C.	
b. Secondary - Senior	Pre-Vocational/ Vocational	Senior Secondary School Certificate (SSSC)	JSSC	
4. Technical Colleges	Craftsman	1. WAEC (Tech) and Fed. Craft Cert. (FCC) 2. National Tech. Cert. (NTC).	JSSC	
	Master Craftsman	1. WAEC (Tech) Advance 2. Advanced National Tech. Cert. (ANTC).	WAEC (Tech) & Federal Craft Cert.	
5 Polytechnics and Monotechnics such as Colleges of Agriculture, et-cetera	a. Technician	National Diploma (ND)	SSSC with 4 credit passes in relevant subjects.	
	b. Technologists /Higher Technicians.	Higher National Diploma (HND)	ND plus at least one to two years of post-ND cognate work experience.	Yet to start
	c. Professional	Post-HND/Professional Diploma	HND in the appropriate discipline	
6. University	Professional	Degree	SSSC with 5 credit passes in relevant subjects.	

training schools. The National Directorate for Employment in its drive to create jobs and increase self employment among youths has introduced various schemes, like the National Open Apprenticeship Scheme (NOAS), the School on Wheel Programmes. And within six years of its existence, NDE has enrolled about 483,438 apprentices and graduated 267,215. Current enrolment in the NOAS stands at 19,513 (Source: NDE Statistics 1993).

As at now, the nation can boast of having a technical education structure that has made adequate provisions for the training of all types of technical manpower required by the economy. There is in each State of the Federation as follows:

a. at least a university, except in Taraba, Yobe, Kogi, Jigawa and Katsina;
b. at least a polytechnic except in Taraba, Delta, and Federal Capital Territory;
c. one to four technical colleges;
d. one college of agriculture except in Osun, Kogi, Rivers, Ogun and Yobe; and
e. an NDE apprenticeship training scheme

Are the Objectives of Technical Education Being Met

The attainment of independence in 1960 marked the beginning of serious efforts by Nigeria at agricultural modernisation, the establishment of manufacturing industries, the training of technical manpower, the development of infrastructural facilities and the effective exploitation of important mineral resources for exports and for processing for local consumption. One of the ultimate aims was to develop local technological capability through co-operation and bilateral agreements with foreign sources of technology. But the nation was confronted with the problem of lack of absorptive capacity, namely, adequate manpower, research and development (R & D) facilities and infrastructure. This arose from the fact that some of the advanced and sophisticated technologies well suited for the countries where they were made are difficult to adapt in less developed countries like Nigeria. So the Federal Government was expected to create the necessary economic, political and cultural climates to effectively absorb the foreign technology. But technology absorption can only take place in an environment where the following exists;

a. political stability

b. governments' willingness to give assistance or aid in the search for and encouragement of exploitation of natural resources; and

c. education and training programmes not only for children but also for adults to produce a committed industrially skilled labour force, not migrant, not seasonal but steady and dependable (Osifo, D. E. 1982).

So much has been done during the execution of the four national quinquennial and rolling plans in response to the demand for various types of technical manpower. Perhaps it may

be necessary to ask if the objectives of technical education were now being achieved? These objectives are being achieved if;

a. technical education institutions were producing the required quantity of technical man power for the economy;
b. the diversity of skills of the products satisfy the demand by all sectors of the economy; and
c. the manpower being produced are of good quality for our local industries and are capable of absorbing the advanced/sophisticated technology being imported into the country.

Polytechnics Quantity of Manpower Required

Manpower planners may not disagree with the known fact that it is not easy to project the exact number of manpower required by an economy. So for our purpose we may get the response to the question if the manpower requirements projected in the Third and Fourth National Development Plans and those projected in the National Rolling Plan 1990-92 were met. During the Third National Development Plan 1975-80, the estimated out-turn from the institutions was 29, 030. And with the increase in the number of institutions from 8 in 1975-76 to 23 in 1980, the out-turn also rose from 3,000 in 1975 to 3,055 in 1976, 5,598 in 1977, 6,628 in 1978, 4,359 in 1979 and 9,892 in 1980 making a total of 29,532 (NBTE Annual Reports 1977-78, 1979, 1980).

In the Fourth Development Plan 1981-85, the estimated out-turn was 11,500 in 1981, 17,411 in 1982, 22,760 in 1983, 15,435 in 1984 and 22,219 in 1985 making a total of 89,324 (NBTE Digest of Statistics 1981-1985). And for the first National Rolling Plan 1990-92 the estimated manpower requirement was 107,690. Actual out-turn from the institutions during the period was 103,041 (Source-NBTE Summary of Statistics of Enrolment and Out-turn).

Overall, it may be right to say that the institutions were doing well since the out-turn compares favourably with the projected figures. But in real terms, a lot remains to be done. The ratio of enrolment in science-technology to art-social science based programmes has been about 49:51 in 1990 as against the approved ratio of 70:30. The problem is that a good number of the polytechnics are yet to implement fully the federal government's directives that all polytechnics must include in their curriculum as a matter of priority the three basic engineering programmes, namely, civil engineering, electrical/electronic engineering and mechanical engineering (Fed. Govt. 1987) and that the enrolment ratio of science technology to art-social science programmes should be 70:30. If all the 38 polytechnics have fully developed departments of engineering, the enrolment ratio may be reversed to its proper place of 70:30.

The importance of the engineering courses cannot be over-emphasised if it is now recognised that a modern society must be an industrial society. And if some thought is given to the theme of this workshop, we must be reminded by the statement credited to Lord

Howie of Troon (1989) in his contribution to a debate on the need for more trained engineers and technicians in the British House of Lords in which he said:

> A modern industrial society is an engineering society. It is not an Accounting society; or a Lawyers' society or an Actors' society. Almost everything that we see is an aspect of engineering, but the paradox is that this passes unnoticed by the public.

This above statement is also true of a developing nation such as Nigeria. The present level of production of engineering technicians and technologists needs to be adequately addressed by both the institutions and their proprietors if technical education is to play its proper role in the economy. The skills of engineering are used to transform agricultural produce into goods for internal consumption and for exports to earn foreign exchange to reduce the nation's balance of payment and create jobs to improve the earnings of members of the society.

Diversification of Skills

From the experiences gained during the second National Development Plan, technical institutions producing intermediate level manpower were directed to expand their curricula to include all of the following programmes in addition to the existing basic engineering programmes: Petroleum and Mining Technology; Metallurgical Engineering, Chemical Engineering, Marine Engineering, Refractory Engineering, Water and Irrigation Engineering; Agricultural Engineering and Mechanisation; Medical and Science Laboratory Technology, Architecture, Surveying, Town Planning, Building and Civil Engineering, Refrigeration and Air Conditioning, Textile Technology, Printing Technology, Agricultural Sciences, Fisheries, Food Technology, Dietetics, Wood and Paper Technology; NCE (Technical); Accountancy, Banking and Finance (Third and Fourth National Development Plans 1975-85).

Since then more programmes have been introduced in line with the demand by industry. These include programmes in Material Science which includes: Polymer and Rubber, Technology and Ceramics and Glass Technology; Fabrication and Welding Engineering Technology; Foundry Technology; and Computer Science. The Federal Government (1990) directed that the enrolment and graduate out-turn in the following courses be increased to meet the high demand: Chemical Engineering, Metallurgy, Textile Technology, Laboratory Science Technology and Mechanical Engineering Technology.

Although not all institutions have started running the mandatory technology based programmes, especially the new ones, it may however be right to say that there is at least one technological institution - a polytechnic or monotechnic that offers a curriculum that includes skills identified in the nation's development plans and more, save for Refractory Engineering, Paper Technology and such HND options as Computer Technology; Instrumentation and Control, et cetera. Where the demand for manpower is very high in a field as in the

case of agriculture, most States and even the Federal Government have established specialised monotechnics to meet the needs. Other examples of specialised monotechnics are the Petroleum Training Institute Federal Survey School, Oyo, Federal College of Leather Technology, et cetera. Given adequate funding to expand their physical facilities and properly equip them, the existing 38 polytechnics and over thirty monotechnics will go a long way in producing all the types and number of intermediate and high level manpower required in the disciplines mentioned above.

Quality of Manpower Produced

The quality of technical manpower available in any economy dictates to what extent that economy can grow. The products of our technical institutions should be able to perform entry level skills, acceptable to employers in their fields and other end users. By 'skill' here is meant "competence built on knowledge and understanding. It is not the empty acquisition of factual knowledge" (Rt-Hon. Kenneth Baker, 1989). So in the case of the polytechnics their products must be able to perform competently as technicians, technologists or higher technicians in their fields of specialisation immediately on completion of their programmes.

In view of the importance of technical manpower to any economy, no government anywhere in the world can afford to gamble with the quality of education and training they receive. For example, when the Federal Government (1975:) discovered that employers' main reasons for employing very few graduates of our universities and technical colleges (now polytechnics) even though there were many vacancies at that level, was that the curriculum they followed lacked practical content, something was done to correct the situation. The Federal Government caused a review of the curriculum to include SIWES (Student Industrial Work Experience Scheme) and introduced a system of national certification both in the polytechnics and the technical colleges. It then established the NBTE to:

a. Co-ordinate all aspects of vocational and technical education falling outside the universities. This means all diploma programmes falling below university first degree, irrespective of the institutions where they are offered;

b. lay down standards of skills to be attained and to continually review such standards as may be necessitated by technological and national needs;

c. advise on and take steps to harmonise entry requirements and duration of courses at technical institutions (Federal Government: NBTE Decree 9 of January, 1977).

The Education (National Minimum Standard and Establishment of Institutions) Decree 16 of 1985 placed the responsibility for the establishment of minimum academic standards in polytechnics, technical colleges and similar institutions on the Minister after consultation with the Board and thereafter the Board has responsibility for accrediting the programmes of all institutions for the purpose of award of national certificates and diplomas and other similar awards and for entry into national and zonal examinations in respect of each institution.

Accreditation here means public recognition of a programme that has met the established minimum academic standards as adjudged by an accreditation team consisting of representatives of the users of the products and the academic community; and the programme is therefore producing diplomates that can perform entry level skills at their level of training in their specialised fields. Hence for an institution to earn accreditation, NBTE must be satisfied that the curriculum is adequate and the goal and objectives of the programme were being met: there are adequate resources, qualified students and teaching staff, books, equipment, and materials to teach the programme; the standard of tests and examinations and projects and answer scripts of the students are at the level of the programmes and there is a satisfactory rating of diplomates by their employers.

There is no doubt that the introduction of the accreditation scheme has assisted institutions in improving the quality of programmes offered at the National Diploma (ND) and Higher National Diploma (HND) and by implication, ensuring that the quality of diplomates of the programme are good.

Technical Colleges

At the technical college level, there has also been phenomenal growth in their number and their enrolments. From a total of 29 technical colleges (then known as trade centres and technical training schools) enrolling 5,000 students in 1960, there were about 120 technical colleges with enrolment of about 60, 000 in 1992. The number of institutions include the recently established Federal Technical Colleges at Lassa (Borno State), Otukpo (Benue State), Okposi (Abia State), Kafanchan (Kaduna State), Shiroro (Niger State), Ilesha (Osun State), FCT, Ijebu-Ode (Ogun State), Zuru (Kebbi State), Jalingo (Taraba State), Uyo (Akwa-Ibom State).

Under normal conditions, the enrolment in the technical colleges is far lower than the enrolment of such institutions if related to the internationally recognised ratio of 1:4:30 professional to technician/technologists to craftsman. If the enrolment in the Polytechnics stood at about 104,000 in 1992-93 session, enrolment in the technical colleges by the application of the above ratio should be 780,000 and not 60,000.

The technical colleges have just started to implement the new curriculum and course specifications for each trade in which the new certification NTC/ANTC and NBC/ANBC will apply. A list of the trades to be examined by NABTEB is attached as appendix II.

Our major concern is the state of the technical colleges at present. NBTE undertook preliminary accreditation/advisory visits to the 90 technical colleges existing between 1988 and 1989. The findings of the teams raised a fundamental issue of neglect by the proprietors. Out of the 90 technical colleges visited the reports showed that:

a. they offered a total of 551 programmes;
b. 99 (18%) of them had adequate workshop teaching accommodation;
c. only 8 (1.5%) of the workshops were adequately equipped to teach the trade courses;
d. 48 (8.7%) had qualified technical teachers to teach the trade skills;
e. only 98 (20%) of the colleges had physics laboratories;
f. only 7 (6.7%) of the 90 colleges had adequate equipment to teach physics even though they were yet to be installed for use as soon as a physics laboratory space is provided;
g. 20 (22%) had chemistry laboratory accommodation;
h. 7 (6.7%) had equipment but not laboratory accommodation where they can be installed;
i. most of the 90 institutions do not have library facilities. What was available cannot be accepted even as a reading room;
j. most of the institutions located outside urban areas which are far away from he national grid do not have regular power supply. Some of them do not also have even a standby generator;
k. inadequate provisions for water supply to the various workshops, laboratories, persist; and
l. only 15 (6%) of the colleges have industrial attachment schemes and or undertake some form of production work (Source: NBTE Advisory Reports 1989).

These advisory visit reports corroborated with the result of the WAEC (Technical) examinations which have constantly registered a very high failure rate of more than 70% in the past 20 years. This means that the technical colleges are producing artisans instead of craftsmen, since most of them failed the WAEC (Technical) examinations that would have qualified them for a craftsman's position. At the advanced craft level which should produce the potential instructors for teaching the courses, an average enrolment of 75 (at Yaba and Enugu) candidates in the (6 No. Trades - Bricklaying, Painting, Electrical Installation, Carpentry & Joinery, Machine Woodworking and Motor Vehicle Technicians Part II were enrolled and results recorded in the WAEC (Technical) Advanced Craft Certificate Examinations are similar to those of the Craft Certificate examinations. The Federal Government's policy that requires each state to have at least one of its technical colleges offering Advanced Craft Courses should be implemented to boost the supply of master craftsmen in the economy.

A re-visitation to some of the technical colleges including the new Federal Technical Colleges in 1993 did not show any remarkable differences between the earlier reports and those of the recent visits in 1993. Earlier on, the Board had identified some of the main constraints of the colleges to include the involvement of the staff of the Ministries in the day to day management of the technical colleges. At least, in States where the Board's recommendation to all proprietors of technical colleges to establish a State's Technical Schools

Board (not an advisory Committee/Board) have been carried out, a lot of improvements have taken place in the funding, staffing and management of the technical colleges; and which have also reflected better students' performances at the WAEC (Tech) examinations. One thing that is true is that these colleges, although belong to Senior Secondary Schools classification are more complex, and require more financial inputs than a normal secondary school.

Problems of Technical Education

There are three major constraints to technical education in Nigeria at present: inadequate funding, the environment and the teaching staff. Most affected by these constraints are the science-technology based disciplines, especially the basic engineering which are mandatory in the curricula of the polytechnics. The tools, instruments and machines required for laboratories and workshops which are not produced in Nigeria have to be imported at great cost. This also applies to the spare parts to maintain and service the equipment. This must be the reason why, out of the 38 polytechnics existing in 1993, only 11 (29%), 7 (18%) and 9 (24%) had approval/accreditation to mount civil engineering, mechanical engineering and electrical/electronic engineering programmes at HND level; averagely about 60% of the institutions have accreditation/approval to mount the three basic engineering programmes compared to almost all of the 38 institutions having approval/accreditation to run the business related programmes at ND/HND level (NBTE: Directory of Accredited Programmes 1993). It does not have to be overemphasised that the curriculum of a polytechnic that excluded the basic engineering and related technology based courses may not be producing the ideal manpower mix needed for a healthy economy. Capital funding of the engineering programmes should be given priority attention in the nation's capital resource allocation.

The Environment is another serious constraint to technical education because organisations, individuals and the community see the institutions as belonging to Government that have more resources to fund them. So the environment neither promotes or sustains growth. Although the private sector employs the bulk of the products of technological education, they contribute least towards its provision. Most employers end up their contributions with the 1% training levy paid to the Industrial Training Fund; and in some cases accept a few students on SIWES. A good number of students who should participate in SIWES cannot do so because of the Federal Government's inability to pay the stipends of the students. Why can't industries pay students on SIWES stipends to maintain themselves during the period like it is done in the developed countries. Afterall these students can be productive to justify whatever stipends they will be paid during the period if given proper work schedule under supervision.

Technical education institutions are yet to benefit from research activities of organisations and individual philanthropist are reluctant to donate some or all the pieces of equipment for an essential laboratory or workshop or endow a chair of the department related to their organisations activities. But these individuals and philanthropists donate substantially to

sponsor sports and similar social events that make very little contributions to the national economy. This should not be interpreted to mean that sporting activities should not be sponsored by those who can afford it. It is only drawing attention to the fact that technical education is crucial to our economy and because it is expensive, government alone cannot do it all. It needs the support of all - government, private and public organisations and philanthropists.

Teaching Staff is another major constraint. The demand for qualified and experienced professionals of the type that are required to teach in the polytechnics and technical colleges is very high that most of them prefer to go to industry where the salaries and allowances are higher. This means that to have good teaching staff, institutions must embark on the implementation of a very aggressive staff development policy. This, for the polytechnics will include periodic industrial attachments, formal post-graduate studies and attendance at conferences, seminars and workshops relevant to the disciplines. Teacher education is also crucial to enable lecturers improve on the delivery of the subject matter. For technical colleges one of the reasons for the high failure rate in the WAEC (Tech) examinations is the unsuitable staff deployed to teach trades in which they have no skills. It is impossible for anyone to teach the skills he does not possess. So to deploy an NCE (Tech) graduate to teach a trade course instead of introductory technology is tantamount to putting a square peg in a round hole.

More technical colleges should be designed to teach the advanced craft programmes. It is proposed that the Federal Government should for a start equip at least six of the new Federal Technical Colleges to offer the advanced craft courses to boost the production of these very important cadre of technical teachers. It should be noted that because of the peculiarities of trade skills, a bachelor's degree on top of an NCE (Tech) in Metal work will not equip the teacher adequately to teach Welding and Fabrication or Mechanical Engineering Trade skills. It must be an Advance Craft Certificate depicting the holder as a master craftsman followed by the degree in vocational education.

Future of Technical Education in Nigeria

The importance of technical education that produces manpower which creates, absorbs, applies, nurtures, maintains and sustains technology cannot be over-emphasised. As technology is constantly changing, so must the education curriculum change and there must be available the resources required to support the change. Hence the future of technological education will depend on

a. further improvements and diversification of the curriculum to teach the current and emerging skills needed to boost the nation's technology absorptive capacity; and
b. the ability of the nation to eliminate or reduce to the barest minimum the constraints already identified in the paper - inadequate funding, inadequate support from the environment and improvement in the quality of teaching staff.

On the diversification of the programmes, the curriculum shall include emerging skills of priority to the economy, such as computer technology, materials technology, machine building, and high-technology based programmes such as aeronautical engineering, mechatronics and maritime studies.

Each technological institution should develop as a centre of excellence in at least a branch of technology. There is no reason why the next order of basic machine and hand tools to be used to either replace the existing ones or for programmes to be established in new institutions should not be products of our technological institutions.

On adequate capital funding, the situation may be improved upon if:

a. the proprietor of a new technological institution or those established within the last five years that have not done so, should comply with the provision of the Education (National Minimum Standard and Establishment of Institutions) Amendment Decree 9 of January 1993 which requires the proprietor to make available at least N100m for capital development within the first five years of its existence.
b. the current strategy for funding capital projects is reviewed. It is proposed that the terms of reference of the newly established Education Development Bank be extended to include giving loans to fund capital projects such as the establishment of the basic engineering and other priority technology-based programmes.

On the issue of support from the environment, it is likely that the involvement of the organisations and philanthropists in the various activities of the institution may give them more understanding or the needs of the institution to which they may be happy to respond.

Each technological institution should properly establish itself as a centre for applied research and technology adaptation, innovation and development in order to improve upon the nation's capacity to absorb, use and maintain the sophisticated technology being imported to enhance our productivity.

Conclusion

Technical education in Nigeria has made very steady progress since the Third National Development Plan 1975-80 and subsequent National Development and Rolling Plans. At the tertiary level, the polytechnics have increased in number, their curricula have been diversified to meet the demand for technical manpower in the nation's quinquennial plans. The nation is today rest assured within the limit of our resources, of well trained intermediate and practically oriented high level technologists from the polytechnics and similar tertiary institutions.

Adequate capital funding of the institutions and technology-based programmes will enhance the quality of technical education towards building a healthy economy. For the future,

the curriculum of the polytechnics need to be further diversified to include high-technology and more advanced professional programmes beyond the HND.

The technical colleges have a peculiar problem which needs to be properly resolved. If they are expected to play their roles effectively, there is an urgent need to re-examine their financing and management. The rate of pass in the national examinations may be substantially improved upon with improvements in the quality of teaching staff, the supply of consumable teaching materials and well equipped workshops. For a trade programme, the best teacher is a master craftsman in the trade.

BIBLIOGRAPHY

1. Adejumobi, S A, and Ivowi, UMO (Editors) Comparative Education for Nigeria NERDC Press, Lagos 1990.

2. Faluyi, Engr. A O Present Instructional Capabilities of Technical and Technological Institutions: Paper Delivered at the National Seminar on Vocational and Technologi cal Education and Training in Nigeria organised by the NBTE September 1989, Kaduna,

3. Federal Government of Nigeria. Second National Development Plan 1970-74 Lagos: Federal Ministry of Economic Development, 1970.

4. Federal Government of Nigeria. Third National Development Plan 1975-80 Vol. 1 Lagos: Federal Ministry of Economic Development, 1975.

5. Federal Government of Nigeria. Supplement to official Gazette No. 5 Vol. 65. National Board for Technical Education Decree 9 of 11 January, 1977. Lagos: Federal Government Printers, 1977.

6. Federal Government of Nigeria. Fourth National Development Plan 1981-85. Vol. 1 Lagos, Federal Ministry of National Planning 1981.

7. Federal Government of Nigeria. Supplement to Official Gazette Extraordinary No. 43, Vol. 72, 20th August 1985 - Part A: Education (National Minimum Standards and Establishment of Higher Education Curricula and Development in Nigeria. Lagos: Federal Government Printers, 1987.

8. Federal Government of Nigeria. Views and Comments of the Federal Military Government on the Report of the Study of Higher Education Curricula and Development in Nigeria. Lagos: Federal Government Printers, 1987

9. Federal Government of Nigeria. National Policy on Education NERDC Press, Lagos 1981 Edition.

10. Federal Government of Nigeria Joint Admissions and Matriculation Board Decree 33 1989.

11. Federal Government of Nigeria. National Rolling Plan 1990-1992. Lagos 1990.

12. National Board for Technical Education, Standards for the Accreditation of Diploma Programmes Offered by Polytechnics and Similar Post-Secondary Technical Institutions. Kaduna: NBTE, 1987.

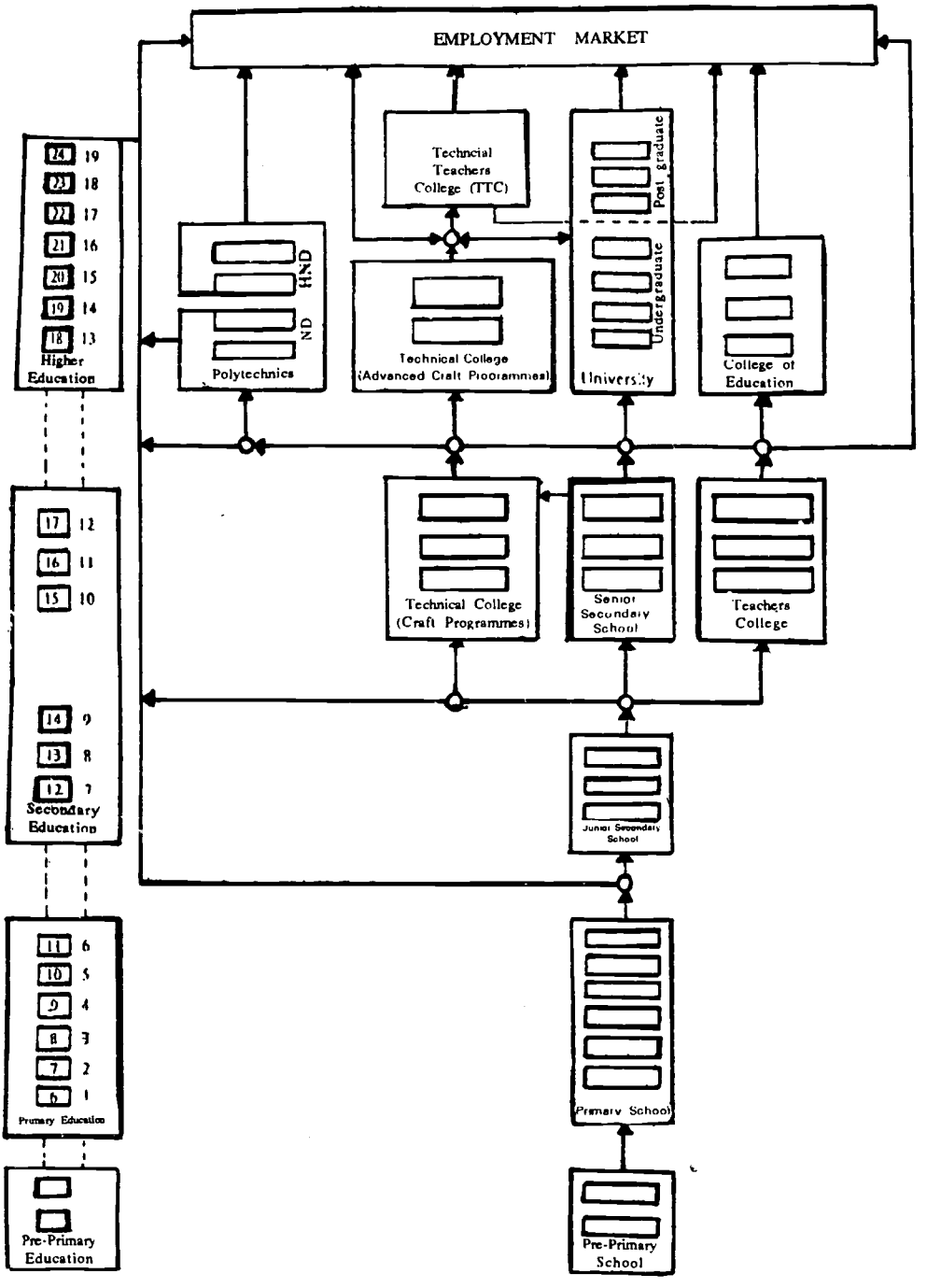
13. National Board for Technical Education. Directory of Accredited Programmes in Nigeria Polytechnics and Similar Post-secondary Technical Institutions. Kaduna: NBTE, 1987.

14. National Board for Technical Education. Digest of Statistics on Technical Education in Nigeria 1984/85 - 1986/87. NBTE, Kaduna 1987.

15. Osifo, D. E. The Role of Technology in the Industrial Development of Nigeria. Heineman 1982.

16. Witty, R. Nelson Junior English Dictionary - Nelson 1992 edition.

Appendix I



Appendix II

National Board for Technical Education, Kaduna, New Technical College Programmes

Programme	Modules of Employable Skills
1. Mechanical Engineering	1. Fitting 2. Turning/Lathe Worker 3. Milling Machine 4. Boring 5. Inspection & Measurements 6. Presses Jigs & Fixtures
2. Electrical Installation & Maintenance Work	1. Domestic Electrical Installation 2. Industrial Installation 3. Cable Jointing 4. Winding of Electrical Machine
3. Motor Vehicle Mechanics Work	1. Fore Court Service 2. Suspension of Steering and Braking Systems 3. Transmission Reconditioning 4. Engine Maintenance 5. Engine Reconditioning
4. Fabrication & Welding Craft Practice	1. Sheet Metal Work 2. Structural Steel Work 3. Structural Mechanics & Specifications 4. Welding 5. Gas Welding & Cutting
5. Painting & Decorating	1. Decorative Painting 2. Screen Printing 3. Line & Sign Writing 4. Spray Painting
6. Foundry	1. Pattern Making 2. Moulding & Core Making 3. Melting Processes 4. Finishing & Quality Control 5. Core Making 6. Melting, Molten Metal Handling
7. Textile Craft Practice	1. Yarn Production 2. Fabric Production 3. Surface Design & Printing of Textiles 4. Bleaching, Dyeing & Finishing

8. Catering Craft Practice	1. Cookery 2. Wine & Drink Service 3. Baking & Confectionery
9. Vehicle Body Building/Body Repair	1. Vehicle Body Building (Wood) 2. Vehicle Body Building (Metal) 3. Trimming 4. Body Repair Work 5. Vehicle Painting 6. Vehicle Processes 7. Vehicle Body Design & Production 8. Lining Sign & Design
10. Radio/TV Electronic Craft Practice	1. Radio 2. Television 3. Electronic Servicing
11. Plumbing & Pipe Fitting	1. Gas & Steam Work 2. Sanitation & Drainage 3. Hot & Cold Water Services 4. Gas & Eroge Welding 5. Heating & Ventilation
12. Refrigeration & Air-conditioning Work	1. Industrial Air-conditioning 2. Compressors, Motors & Generators 3. Cold Store Installation/Maintenance 4. Ice Plant 5. Transport Air-conditioning
13. Carpentry & Joinery	1. Temporary Carpentry 2. Fundamentals of Machine Wood Working 3. Permanent Carpentry 4. Joinery
14. Men's/Ladies Garment Making	1. Wholesale Tailoring Garment 2. Design, Construction & Modelling 3. Textile for Tailors 4. Garment Construction (Trousers & Shirts) 5. Garment Construction (Coats) 6. Garment Construction (Tailoring) 7. Fashion Design 8. Finishing
15. Brick & Concrete Work	1. Blocklaying 2. Brick Laying 3. Concreting 4. Floor Finishing

16. Printing	1. Photography 2. Lithographic Printing 3. Letterpress 4. Bookbinding 5. Screen Printing Process 6. Finishing
17. Furniture Making	1. General Woodworking 2. Fundamentals of woods making 3. Furniture Design Construction 4. Metal - Wood Furniture 5. General Metalunling 6. Furniture Finishing 7. Upholstery
18. Cosmetology	1. Hairdressing 2. Body Care 3. Beauty Therapy
19. Instrument Mechanics	1. Mechanical Instruments 2. Electrical/Electronics Instrument 3. Prieumatic Instruments
20. Mechanic Roadworking	1. Fundamental of Machine Woodworking I & II 2. Lathework/Turning 3. Spindle Moulding 4. Routing 5. General Wood
21. Upholstery	1. Design & Construction of Upholstery 2. Furniture Design and Construction 3. Modern Upholstery Design and Construction 4. Period Upholstery, Design Construction and Maintenance
22. Auto Body Repair and Spray Painting	1. General Metal Work 2. Sheet Metal Work 3. Welding 4. Upholstery 5. Spray Painting 6. Auto Body Work
23. Agricultural Implements and Equipment Mechanics Work	
24. Stenography	1. Shorthand 80 w.p.m. 2. Typewriting 35 w.p.m. 3. Office Practice

25. Typewriting	1. Typewriting 25, 35, & 50 w.p.m. 2. Office Practice
26. Book Keeping	
27. Appliance Repairs	
28. Shoe-making and Repairs	
29. Architectural Draughtsmanship	1. General Woodwork 2. Building Construction 3. Technical Drawing 4. Descriptive Geometry 5. Architecture Drafting
30. Mechanical Draughtsmanship	1. General Metalwork 2. Machining 3. Basic Electricity 4 Technical Drawing 5. Descriptive Geometry 6. Mechanical Drafting 7. Electrical Drafting
31. Tool and Die Making	
32. General Studies	1. English Language 2. Mathematics 3. Integrated Physical Science 4. Liberal/General Studies

Contribution by the Representative of the National Association of Technological Engineers

By Mr Abimbola Daniyan, the Chief Executive of an Engineering Firm and representing the Engineering views of the National Association of Technological Engineers. See also excerpts from his unread paper submitted to the Workshop

The first thing is this, I note with some mixed feelings that in every discussion in Nigeria, be it about the economy, be it about agriculture, be it about anything you want to talk about, we have virtually repeated so many things that we already know or that we didn't quite know or we didn't quite emphasize and so on.

These things tend to boil down to one thing; there is a whole load of knowledge on who we are, why do we have this condition. But not necessarily on the fundamentals. We talk of the ratio of production of craftsmen to technicians/technologists, to engineers, to scientists, but nobody really talks about the conditions in which these people are produced.

The first thing I will tell you is about my years of experience in industry. We have, just before the Flour Mills went down, in the early eighties because of wheat importation problem, the Nigerian Bags Manufacturing Company (BAGCO) had a very good crafts Training Centre and I can tell you, it was German. They learnt a great deal at that time in co-ordination with Volkswagen school. By the time I was about to leave BAGCO, I told the company, and it was a very strong case we had to make, that will, if you want to help this country, it is good to stage jamborees, it is good to have table tennis competitions, sponsor cultural shows and so on, if you want to help the country, first, unemployment is so large, but I know that the skills content of even the employed in Nigeria is so low that we do not have the kind of skilled manpower we talk about. We don't. We have people who have read the books, that's all.

The problem of technical education in Nigeria is not just about ratio, not about quantity but about quality. Basically, what is missing in Nigeria is that from the beginning to the end, the education is about "you learn some facts and return the facts to the sender." That is all; and that is why the boys and the girls who go into this system are not imbued with the spirit of that system.

The education which we are trying to acquire today, which is technical, might look, in itself, like it is Western education. There is nothing Western about it in specifics. It is just that a people have found a way of improving their old ways and that way become universalised because of the application of science and various modern techniques.

Different countries have approached this modernisation, this improvement, this incremental improvement process in different ways and have achieved varying degrees of success. Nigeria of course, is one of the failures that we know and that is why we are at this workshop today. To start with the curriculum from the beginning to the end is not about teaching human beings to be more competent about life. It is not an education for life. It is just formal structures which are there. You can put in all the billions in this world, the same result you would get is what you would get here in twenty years.

If we are desirous to make a change, if Nigeria is to be any country to be reckoned with by anybody, no matter how many positions we juggle for in the United Nations, in the world bodies (Nigerians have been everywhere in those places but has it really dignified Nigeria), we must go back to the basics. And this is why sometimes when we speak, we speak more like evangelists for what we think is really painfully missing.

The first thing is this: There is a basic misconception and misperception of what education is really about. We are all here; we have been schooled in the Western way, all of us have had varying degrees of slanted education. But today somehow, we are all living well but maybe not so well as we should live because of the low productivity of the country.

We are shortsighted about what constitutes the wealth of the nation. A Nigerian who depends on importation of goods for making money cannot be said to be a rich man in reality. The Chinese man, the Taiwanese or that small man in one small corner in Hong Kong, producing thousands of products everyday, is a much richer man but he doesn't make the noise we make. And he's the one who has got the true perspective on life. A country without a production base is a joke.

The education system requires a reform. The universities discriminate against the polytechnics. The polytechnics, in turn, think that they are so big, they discriminate against the technical colleges. Technical colleges themselves think that they are so glorified that they discriminate against the vocational, schools. They are all involved in the same rounds of joke. So if we want to change this, if we are honest and desirous of change, we would then look at what is really wrong.

And we should not blame our colonial masters for this state of affairs. Why should a child born in Nigeria since after independence blame the colonialists for so many things. I don't think we can blame them for this because they may have blinded us because of the need to rule us the way they did, but we can at least open our eyes having seen what is going on everywhere. We admire Germany, we admire Japan, but I know that Japanese development has its origin in Germany because of the high level of co-operation between Japan and Germany much earlier in the century. And it has formed the basis of what the Japanese, using the Asiatic Culture, which emphasize withdrawal, which emphasize so much patience, are adding on in order to actually beat the West today .

I have worked with Swiss. My first job was working with Swiss mechanics in Nigeria, Swiss quarry. I have worked with British. I have worked with Greeks and Turks. You begin to see that there are certain gaps. We have good talents and these people recognise it that, oh, these people have some good talents, but our system and our environment have rubbished us. And we would remain rubbished unless we go and look at what is wrong with us.

And I then began to see that those things we ought to emphasize are not emphasized. If you go to many of the companies today, multinational conglomerates especially, you'll find out that Nigerians are put in jobs where they feel big but have no substance. Many of them at the end of the day, when they leave those jobs, many die so soon because all of a sudden, everything doesn't come automatic. The plumbing in his house has gone bad, he has no clue. His car has broken down, he has no idea. Yet he is an engineer. The few who have broken through at all were helped by only one thing - an inner personal drive which the educational system does not imbue anyone with, it is a personal quality but you can do much to help people along that direction.

On craft training, anyone who thinks that an underdeveloped country like Nigeria with the resource base it has can develop with all these formal structures without first putting craft skill content in the education at every level and making them compulsory does not get it.

In the polytechnics, I know, we have the statistics because we went to take some survey of this. Let us look at how many man hours are wasted with all those lathe machines, milling machines, whole laboratory equipment that lie idle. You have closed for the day at 6.00 p.m. The next day, may be at 8.00 a.m. or 9.00 a.m. before somebody begins to work there. That is lost production opportunity. Why is it that in those institutions, you set up projects every year. Say OK go and study the production of such and such a thing. Those things never get realised yet the potentials to realise them are there. So there is a basic organisational problem and that comes from the perceptual problem.

The perceptual problem itself is a carry over of the philosophical weakness of the colonial structures we inherited by which we refused to change because all of us, who are there to discuss those issues are getting by with our lives. We want our children to follow suit. But we do know that at the end of the day what Nigeria needs to move the country forward is not the tonnes of degrees or diplomas and papers which we have. It is actually the skills which we imbue our system with.

Everybody wants his child to be in a federal government college. Everybody wants his child to go to a school where the curricula have no bearing to real life, more of music, horse riding sports and so on. This has no bearing to the conditions of an underdeveloped economy.

In the WAEC mechanical engineering craft system the ideal was to examine a candidate in how to make a life object. That never happened, in my experience as an examiner. The reason is simple. The teachers who were drawing up these questions had no industrial background. How many of the engineering professors, deans, heads of departments, senior lecturers, have any background in industry? How many years of skills? Hand-on skills or real knowledge? Some six years ago I was not surprised when one of my friends in the Faculty of Technology in the University of Ibadan - he later left Nigeria because he just couldn't make ends meet - said he admired so much an Indian who had been deployed from one of the United Nations organisations into his department: "If they went on industrial visit, there would be problems in the factories, he could suggest hand-on solutions right there because he knew it. He had done it." You can never master technology or if you want to call it engineering, by just reading all the books in the world. You'll know nothing.

The restructuring of Nigeria's educational system, in order for it to be a sound foundation, for a vibrant economy, or for economic development must involve recognising that no child wants to be frustrated in his life and that is why the enrolment in the technical schools and technical colleges may forever dwindle. So long as we run a system whose whole direction is to create some elite who will benefit permanently and those who will remain on the ground for ever, then we will not move forward.

The reform will take three forms, three levels:

1. The first thing is that we must recognise where we were in the traditional system we had. The various available skills and technologies, we would study them and know them. Identify the persons who are the carriers of those skills. Those who knew what we are talking about and use them as focal point for improvement and development of other people who can carry forward that skill to the next level.

2. You look into the curriculum of the institutions today. You'll find a lot of things which are just not appropriate. We talked now about computer studies and that there are so many computers yes, we ought to have something in computer - that is the way we think - Ad hoc! It's just like when we open that door, it squeaks, the squeaking door gets the oil. That door is squeaking, give it oil, that is what it needs. And that is the problem.

3. Next we must identify technologies of national priority around which we would now build a core of people who are knowledgeable and competent and then borrow people through Dornier, through German technical assistance programme, through the Japanese, Indians, whoever, and then actually drill our people to be able to use their hands - including the so-called engineer or the so called technologist. Without doing that, whatever we say today would just end that way.

4. No child should be dead-ended like many who went through vocational training by learning on the job. In industries today the boys who learnt on the job do not want to give their co-operation to the man who has learnt all the books. So at the end of three to five years, when that man who has learnt all the books does not know how to do things with his hands, because he is not shown, he leaves because he can't move forward in that system. Meanwhile, you need some level of intellect to be able to improve upon what you know hand-on. That is what education is all about.

Excerpts from paper submitted to the Workshop by the National Association of Technological Engineers:

ALTERNATIVE PROPOSAL FOR THE THREE EXISTING PARALLEL ROUTES

We of N.A.T.E. strongly feel that Nigeria can produce a more imaginative crop of Technical Manpower than we presently have. Academic qualifications alone of whatever level are not sufficient to make a productive professional and no single educational sector has the monopoly of producing professionals.

Nigeria as a developing nation cannot afford the luxury of professional straight jacketing which those at the helm of COREN, for purely selfish reasons, have imposed on the Nation through the abuse of Decree 55 of 1970. The Federal Government through the Ministry of Education (and with input from our Association, NATE. amongst others) should now as a matter of urgency formulate and adopt a sound, integrate society-based (not only classroom-based) education system. The needs of our society are greatly different from those of the advanced nations. Our indigenous technology and industrial culture have remained at the primitive level of our forebears and our technologies too superficial, essential because of the wrong attitudes, wrong training in the wrong environment, and the elitist, false definition of roles by our contract and title-chasing professionals. Such as why Britain is the 7th Industrialised nation in Europe today, and their Engineers by 'Royal Charter' cannot find employment in other European countries in a common European market. The British Engineering Council, even though not created by a Decree or Act of Parliament like Nigerian COREN, is doing everything possible to correct their shortcomings; she is granting more recognition to the previously underrated groups in her Engineering family. Whereas in Nigeria, after thirty years of independence, we have managed to outplay Britain in her conservative game with nothing to show the world as our contribution to Technological development, except the number of title-bearing "engineers" while contracts are still awarded to Indians, Filipinos and Thailanders. The truth of our engineering education is that it is entirely directed at producing elites - not responsive, practical and commercially-oriented professionals. The Nigerian Engineer is contented with his Engineer title even if he is employed by a hair dresser industrialist. That is why Nigeria must reap bountiful debts of every description from Paris, London, Canada Clubs.

The Polytechnics should not discriminate against Technical Colleges and trade schools. The Universities should BE LEFT OUT in the training of Technical Man-power needs of Nigeria. Instead, we propose Institutes or Advanced Engineering Studies in the following disciplines: Electrical, Electronics, Mechanical/ Marine, Chemical and Aeronautical Engi-

neering and THEY SHOULD BE FINANCED/FUNDED BY DECREE by the firms and industries which have been benefiting from the National wealth for years. 2.5% of their profit plus their R & D budget must be committed to such institutions in addition to Government patronage and subventions: Electrotechnology Limited, G.E.C., Adebowale Electrical Industries Limited, and many other similar electrical firms; Julius Berger, Bouygues, H.F.P., Construction One Nigeria Limited, Cappa and D'Arlberto, Inolaji Nigeria Limited, Alhaji Bagudu and Co. Limited, and many Civil Engineering firms; Steel Works Limited, Adisa Eng. Limited, Nigerian Engineering Works Limited, Nigerian Machine Tools Limited, Delta Steel Company Limited, Ajaokuta Steel Project, National Dockyard Limited, and other Mechanical Engineering Companies; while Lever Brothers Limited, Cadbury Limited, Coca Cola, P. Z. Industries, Nichemtex Limited, ICP Limited; Breweries, Nestle, Shell, Texaco, Mobil, Unipetrol, NNPC Refineries, electro-chemical exomplexes, National Fertilizer Company Limited, and all other chemical and processing industries. These firms and industries should be upgraded from more consumers and assemblers to exporters and manufacturers of repute. The Advanced Institutes should by their funding be well equipped (not only with laboratory grade equipment but with the real life equipment) and staffed to international standard. Professionals so trained shall give this country a leap to industrialisation. Furthermore, teachers, lecturers, instructors, and professors should be involved in a scheme of industrial secondments to projects financed by offshore loans, so that they can learn first-hand the details of implementing projects of such magnitude.

The Government should stop the discriminations against Technical Institutions and their products in terms of funding, placement in Civil Service, rewards and incentives. Whereas, a secondary grammar school graduate entrant into the Civil Service has clearer career path, that is not subject to frustrating bureaucracy, the vocational Technical College graduate entrant is made to suffer stagnation and untold frustration as a result of absence of any career path within the services and poverty-level remuneration regardless of the number of years spent to acquire the vocational skills. For redress, we recommend the following measures:

- Equal recognition for all aspects of learning be it Grammar, Technical, Commercial or Apprenticeship.

- Formulate standards for evaluating competence, knowledge and skills, irrespective of institutions attended and routes followed.

- Implementation of the 6-3-3-4 system by the provision of workshops and skilled instructors.

- Higher recognition for practical skills than theoretical or memory skills.

- Easy transfer of credit earned from one route or the others.

In view of long period of neglect that the Technical and Vocational institutions have experienced, a deliberate policy of preference must be adopted for such institutions in all matters, e.g. the Government fund recently allocated to old grammar schools in Nigeria before 1960 should be doubled and extended to all Trade and Technical Schools in Nigeria, with no time frame.

The poor stage of physical infrastructure, unco-ordinated training methods, poor funding, coupled with the calibre of students admitted into the Technical Colleges are the reasons for the none acceptance of Technical Colleges as Institutions of first choice and reckoning in Nigeria.

As we have always observed, Engineering is the foundation of wealth creation, being productivity based. It is a practical, real life science of creating doing; not examination-based. We propose even more than the Education of Accountants, Bankers, Actuaries, Medical Doctors, that Engineering Education should be society based on NOT school or college based, and that Universities should stop producing engineers. We say this with all sense of responsibility, and patriotism. Their place should be taken over by Technical Teachers Colleges, Polytechnics/Colleges of Technology and Industry-funded Institutions of Advanced Engineering studies in the various disciplines or at best the in-take of engineering students in the Universities should be reduced by 80% - 90% so that only 20% should be trained as engineering scientists and Elective Course, Lecturers/Teachers in the Advanced Institutes,the Polytechnics and the Teachers Colleges.

Engineering Drawing (the language or engineering) fine Arts, Engineering Mathematics, the Physical Sciences, and a Social Science subject should be compulsory subjects from JSS1 SSS3 for those interested in engineering and examination questions should be practically bent for we have not gained much from our century old theoretical examinations.

The newly created Institute of Language Studies by the Federal Ministry of Education should be properly funded so that the text books and medium of instruction should be in local languages. No nation, anywhere in the universe can develop technologically without the development of its language. It took Japan less than 25 years to translate all English Texts to Japanese as a medium of expression in technology, trade, commerce, and in Governance.

The Federal Ministry of Education should as a matter of urgency establish a career, information and guidance council in all Local Government Councils in Nigeria for proper implementation of this proposal and for the transmission of correct career information and government policy to the masses.

The organised private sector, professional bodies like MAN, NACCIMA, NCCA, NASI, Research Institutes, N.A.T.E., NSE and others should be invited to contribute advice and

assistance for the moulding of policies for education, placing and training of Technical Manpower, so that the quality of the academic course and practical training is relevant to the needs of industry/society.

The Fourth Route

We support the Federal Ministry of Education entirely on the fourth route to professionalism. Our proposed philosophy and objectives is along the ITF line - Nigerian Integrated system of training (NIST), a systematic approach to training which views the individual organisation as an integral part of the national training system.

1. We must audit the existing homestead craft centres and industry training schools all over the 589 Local Governments and wards in Nigeria. The Federal, the State or Local Government inland revenue offices, NDE and ITF will be of immense assistance on this issues; they have the data.

2. Upgrading these centres to accredited Training Centres of various levels.

3. Secondment of our proposed engineering extension service expert workers from the three other parallel routes to offer advice, standardise and introduce gradual implementation of research results, these, projects of the other routes into their method of doing things i.e. modernisation (e.g. a blacksmith shop can be upgraded to a small scale classic foundry, using locally fabricated equipment and appropriate production planning and control methods). Introduction to engineering drawing or fine art or Technical illustration and finally documentation, i.e. Job cards, history cards, stock taking, LPOs etc. and financial management.

4. The linkage of home shops and industry-based training schools (like VWON, PAN, UTC, SHELL, NMT, etc. Training Schools) to the Education Ministry and Examination Councils so that they can be appropriately graded and for the control of the secondments of engineering extension worker/expert (just like the relationship of the famous Agricultural Assistants to farmers) to these shops and training centres.

5. Identified family historical lineage trade should be encouraged and integrated, i.e. families that pass down specific skills to their off-springs should be identified and the off-springs brought under the fourth route for professional development without disrupting or removing the off-springs from the family business. He/she can then rise as shown, by attending day release, block release, and evening classes in the nearest Trade school, Teachers Colleges, Technical Colleges, Polytechnics and the Institute of Advanced Engineering Studies respectively e.g. a blacksmith's son or an apprentice with UTC Technical, atter the primary school or Adult literacy classes will still be in his fathers shops or

UTC (now an Accredited Training Centre) with visit of engineering extension worker from local government area or a day or weekend release to the nearest trades school, sit for Trade Test I to III spanning several years as a fitter machinist and proficiency in mathematics, engineering drawing, and integrated science.

He will then graduate into ANTC/ANCC where he will attend evening classes for 3 years studying all courses leading to mechanical engineering - Technical or Master Craftsman. From there, he can sit for professional examination parts I, II and full professional status. Then he moves on to Institutes or Advanced Engineering Studies for Master Diploma, Doctorate Diploma levels in metallurgy or materials engineering. Such a professional so trained will be a pride to the nation with his expertise to fabricate any machine appropriate to our level of development and will compare favourably with any other produced anywhere in the world.

Points to Note

- The progress and development of any nation depend more on the number of confident productive men and women or skills and vocation in place
- We must have a parallel and equal route of attaining professional status, devoid of gaps, 'bridges', dead ends, hypocrisy and bias.
- The urgent need for development of occupational analysis as a means of identifying training needs on an authentic and factual basis.
- The need for the development of job specifications as blue prints for the development of training programmes.
- The need for the development of a universal training programme, i.e.

1. Setting the training objectives.
2. Planning the training programme (methods/tactics).
3. Methods - Role learning, Instructor-Centred or Trainee-Centred?
4. Programme Learning in modules.

The universal implementation of structured training background all over Nigeria i.e.

(1) Selection of trainers.
(2) Selection of Instructors.
(3) Preparing training areas.
(4) Pre-training texts.
(5) Monitoring and progression tests.

The adoption of a universal method of VALIDATION and feedback on training

The new effort must be based on the belief that Nigeria should be a land of bright and full opportunities for all citizens and that education must achieve, among other things, the acquisition of appropriate skills, abilities and competence both mental and physical as equipment for the individual to live and contribute to the technological development of society for it to be meaningful and external.

The Federal Ministry of Labour should as a matter of necessity carry out a detailed existing manpower audit in Nigeria.

Also a detailed disciplines/course specialisation audit should be done to help in identifying and correcting all deficient areas.

Finally, this proposal is an integrated structure, implementing education and training within the society (dynamic environment) and producing technical entrepreneurs and experts (skilled men) in employment and relating education and training to occupation in lateral streams to vertical sectors. The structure identifies four parallel sectors of education and training:-

- The first sector is from primary to secondary schools (reduced to 10% - 20% for Engineering) leading to the universities for Bachelor, Master and Doctorate Degrees.

- The second sector is through the secondary schools and Technical Colleges and Colleges of Education for NCE, Advanced TECHNICAL TEACHERS CERTIFICATE and post-graduate teachers Diplomas in education, Master and Doctorate Degree at the proposed Institute of Advanced Engineering Education Studies.

The third sector (the core for Technological Engineering Education) leads to the Polytechnics for National Diploma-ND and HND and post-graduate Diploma in engineering and to the proposed Institutes for Advanced Engineering Studies to be entirely funded by selected Industries for Master and Doctorate Diplomas producing applied and research fellows, extension experts and consultants in industry.

The fourth sector by way of apprenticeship and the Business and Accredited Trade Training Centres (BATTC) through the Technical Colleges for Advanced National Technical Certificate (ANTC) and Advanced National Commercial Certificate (ANCC) to the professional institutions for certificates, Diplomas, Graduateship, Associateship, Memebership, Fellowship for all Master and Doctorate Diplomas/Degrees, and they can interact with the products of the other levels thereby influencing or contributing to National creativity.

We hope that our proposal would eliminate hypocrisy, dead-end education, inferiority/ superiority complexes that have bedevilled our educational and societal systems. And that whoever enters any of the four parallel routes must be able to fulfil his or her life ambition within same without let or hindrance; should he or she so decide, there must be easy avenue for dignifying transfer from one parallel route to the others in relevant specialisation.

This Association is ready at any time to participate in any workshop for curriculum development of our proposals.

Matters to be Further Clarified

1. The Federal Ministry of Education proposal is still bent towards University elitist education after PDE and PD. The nomenclature of PDE and PD is not of universal acceptance in other countries, hence it is open to abuse and the lateral and vertical progression outside Nigeria will be truncated as such prospective foreign Institutions will first ask for transcripts, and accreditation before admissions, thereby satisfying the fundamental right of such PDE/PD graduates which we believe is against the fundamental philosophy and objective of the proposal.

2. There is somewhat a sort of specialisation derailment or ambiguity in nomenclature like a student with PD inTechnology and crossing to the University for a master of science degree in engineering. Are by implication Technology and Engineering the same? If no, why the possibility of the lateral movement? If yes, then the society should know the true definition as applicable to Technical and Vocational education - also why then the desire to apply two separate names to the courses run in different routes?

3 What is the lateral, vertical relationship like amongst the following: Teachers, Technologists, Engineers and Educationists in the table prepared by the Ministry?

4. The definition of a Technologist - we are told is a professional engineer or any body that performs such functions or an expert in "Technology" Is there any other definition different from the above?

5. The definition of an engineer - Someone who designs, builds and maintains bridges, dams, machines and military fortifications locomotive driver, etc.Should the Federal Ministry of Education also be involved with this orchestrated deception of a polytechnic engineering graduate being subordinate to the graduate Engineer from the university inspite of the many reassuring statements on equality and parity coming from it?

6. May we ask if Technology is a profession different from Engineering? If so then there would have to be a line of vertical streams in Technology i.e. pupil Technologists, senior

Technologists, Principal Technologists, Chief Technologist all not subordinate to any other profession.

7. May we then ask what the Technologist's job specification will be? Will it be different from that of the Engineer? This Association needs to be enlightened. And the society is waiting too to be enlightened!

Conclusion

Products of other routes of the present engineering structure are not in the main stream of policy crafting, thus it will require courage for the Ministry to implement this laudable proposal.

We wish and pray for the Honourable Minister of Education to have that courage and clear vision to implement laudable initiatives, no matter whose interest is affected for we know that there are a number of powerful forces that will wish this proposed policy no good.

We commend the Federal Ministry of Education for taking the bold step to reappraise the entire engineering education structure with a view to reorganising it for the professional recognition and satisfaction of those who use the non-University routes to knowledge and skill acquisition in particular but also for the betterment and rapid technological development of this great nation in general.

German Vocational Training in the Dual System

By Richard von Bardeleben of the Federal Institute of Vocational Training - BUNDESINSTITUT FUER BERUFSBILDUNG (BIBB)

Overview of the Dual System

An overview of the famous German dual system of vocational training, which combines the advantages of young people (trainees) receiving practical training in companies as well as education in vocational schools, was presented to the Workshop by Mr Bardeleben.

One of the unique characteristics of the dual system is that it grew out of the cooperation between the private sector, the trade unions, the State governments, the Federal Government, and the local communities. It is based on enlightened self-interest by the industries and all concerned of the need to pave the way to a successful career for young people and to guarantee a knowledgeable and capable skilled workforce which is the secret of economic success.

The Dual System and the Health of the German Economy

According to Mr Bardeleben, the acknowledged quality of German products, the competitive power of the German economy world-wide, all these factors are attributed by observers of German developments not only to the high level of qualifications and large number of German skilled blue and white-collared workers, but as a result of vocational training which enjoys an important place in the vocational system.

In other words, German companies provide training voluntarily and regularly at their own expense because they believe that this is the best way in which to provide for their own need for a skilled workforce, and because an experienced carefully trained skilled workforce is necessary in order to maintain and increase their own performance and competitiveness.

Mr Bardeleben highlighted the benefits which companies derive from participating in the dual system:

a. Guarantee of qualified junior employees who meet exactly the demands of individual companies.
b. Reduced advertising costs for personnel.
c. No need for poaching to recruit trained labour, using lucrative offers which may be between 10% to 15% above the average salary level.
d. The training of a company add to the good image of the company among the workforce and in the local area.

e. Enables companies to instruct trainees to suit the special aspects of the company, both in technical and personnel terms.
f. Companies get to know the trainees as regards the effectiveness and style of their work, their personal behaviour and their interaction with colleagues.

Problems of the Dual System

Some of the problems which the system tries to cope with are:

a. Increasing difficulty of enterprises to meet the new, more future-oriented programmes.
b. Rapid technological changes which outdates curricula
c. Severe lack of teachers.

Popularity of the Dual System

It is a measure of the popularity of the dual system that almost every school-leaver applies for vocational training and all suitable companies participate in vocational training. This is also a proof that every one is convinced that training makes economic sense for the companies and considerably reduces the risk of unemployment for young people.

In recent years world-wide interest in German vocational system has also increased for other reasons. The reasonably low level of unemployment among youths compared internationally, the well organised transition from school to the world of work, the rapid surmounting of new challenges in professions tailored to the latest state of the art, also helps to put the German vocational training system in high regard.

The dual system differs from pure school education, such as is common for vocational training in many countries, in two main respects. In the dual system, the larger part of learning takes place not in the school, but in production facilities or service enterprises in industry and commerce. The student is a trainee in a company or practices in one of the liberal professions, or in the Civil Service. He or she is released for the purpose of attending a training school, i.e. he is also a student at a vocational school at the same time.

In the dual system, training is divided between the two establishments responsible for providing training: the company and the vocational school. Young people receive formal training in a company for three to four days per week and at a part-time vocational school for one to two days per week.

The vocational training in the company takes place under various conditions and using machines and facilities which reflect the state of the art. The trained skilled worker is thus able to enter a qualified position immediately. For financial reasons, however, the equipment in school workshops is always in danger of quickly becoming out-of-date.

When instructors in the companies are confronted by new technical demands they integrate these directly into the training. Training can largely be performed on productive work; this reduces costs and encourages the trainee's motivation to learn.

Smaller and medium-sized companies, which would not themselves be in a position to offer the complete range and diversity of vocational training as defined in the regulations, can ensure full-fledged training by means of supplementary training programmes in inter-company training centres and school workshops or by trainees completing part of their training in other companies. Small and medium-sized companies - which represent an important part of a market economy - can therefore be fully included in the training.

Legal Framework for Coordinating the Dual System

Although the dual system is run largely by the private sector which provides about 80 per cent of the cost of the system, the legal framework for coordinating the system is provided by the Federal Institute of Vocational Training (BIBB). The Institute has the following responsibilities, among others:

a. Advising the government on vocational training matters.
b. Carrying out the vocational training research within the frame work of the specified research programme. We are mainly a research institute but not doing only research.
c. Yearly drawing up and publication of catalogues of officially recognised trades,
d. Examination and approval of correspondence courses, promotion of these courses through research and advise in accordance with federal government instructions
e. Participate in drawing up of training regulations and other ordinances.
f. The preparation of the yearly vocation training reports
g. Preparation and promotion of pilot schemes.
h. In accordance with general federal government administration regulations to work in the planning and setting up and foster development inter-plant vocational training centres.
i. In view of setting up of a European domestic market as radical changes from planned to market economy in Eastern and Central Europe in which vocational training plays a crucial part, the support of the Federal Institute is in demand in many respects.
j. It carries out research, also prepares teaching and learning materials.
k. Assesses the qualifications of training personnel and advises on setting up of modern training centres.

Content and Process of the Dual System

By a Representative of FESTO, a German company with long experience in technical training and applied industrial control and automation technology.

Training in dual form is not only a question of cooperating organisation and adequate legal background, it is a question of contents and of the process of training. The aim of the Dual System is to improve trainee's knowledge, skills, acquisition of trade experience and good social attitude.

Advantages:

The advantages of these features are:

a. Training is conducted under conditions later found in working life. Trade experience means familiarisation with the realities of working life in companies and with the social relationship within the company.
b. It enables trainees to react promptly on technical, economical and social changes.
c. Contribution to and experience in the success of production process.
d. Promotion of individuality and the feeling of responsibility.
e. Future-oriented qualifications.
f. Up to date training methods and working modern industrial equipment.
g. Dual training is more than pure learning process. It is learning by doing.
h. It is qualifications for employment.
i. It is transfer of theory by simulation to application and the result is transfer of technical competence, social competence and the competence of methods.

Problems of the Dual System

The problems of training under the dual system which companies find solutions to are:

a. How to improve quality of products.
b. How to avoid faults in the production process.
c. How to avoid down time
d. How to solve interface problems.
e. How technology can be transfered.

To find solutions to these problems, companies choose appropriate place, equipment and method of training for providing technical, and social competence for trainees.

Basic Training

For example, the aim of basic training under the Dual System is to provide fundamentals of a trade or technology systematically. A technical college or an industrial training centre may be the appropriate place. And in choosing the training equipment the items chosen must be clear, transparent and learner-friendly - learning by doing. The use of industrial components into the training equipment is a must.

Usually, industrial companies are leading in the use of those technologies to provide the workers with skills and knowledge. To achieve their objectives appropriate equipment must be available. Examples of new technologies in production industries such as sensors robotics and feed back systems. Other examples are practice-oriented training using industrial training equipment, safety and possibilities of simulating.

Industrial production plants are becoming highly complex and increasingly expensive. Therefore, the main factor of dual training primarily should be training by working on the factory floor with real production equipment. But not all training content can be trained in reality. Down time only for training purposes is out of the question because of its adverse impact on production. Besides it would be astronomically expensive hence the use of simulation for such training as flow chart work, working in a team, commissioning, testing, troubleshooting, and maintenance. All this is very important to develop social and competence of methods which cannot be trained completely on the production line.

Supplementary training system

Training must be provided by supplementary training systems which allow a systematic approach and learning on the job.

Other Factors to Improve Production of Learning

Learning and training methods which addresses the respective mental abilities of the learners are as important as the use of learning and teaching aids. Those media such as the use of simulation programmes, computer-based training units, video tapes, interactive video programmes, electronic foils or transparencies, course wares, models and so on have to support and not to replace training hardware. They help to save costs, to improve training and to ensure learning success.

Learning in a system of hardware, software, courseware media gives the best result. Famous German companies are conducting training with model factories and training media.

Conclusion and Recommendations

The competitiveness of the Nigerian industries, of Nigerian products on the world market, the willingness of investors from abroad to invest in Nigeria, depend on a modern, comprenhensive, and practice-oriented technical education. The challenge is to develop and improve technical education permanently.

Contribution of Industrial Training Fund (ITF)

By Alhaji Usman Mohammed

Dual system does exist in Nigeria in some modified form. Way back in 1960 and beyond, some of you who have gone through university education, this is where this thing earlier started. At the time you were in University there were two ways that you blend the theory and the practice. During the vacations, it used to be a very nice long vacations when the colonial masters used to go back for the summer vocations, the students in the university were sent for vacation jobs. Some that were privileged have the opportunity to go overseas and do this vacation job. At the end of the academic year or when the student has finally graduated he is sent overseas for 2 years pupilage, in most cases those that are privileged, and some will remain here in Nigeria to do the 2 year pupilage.

Somewhere around 1973 this thing changed with the incoming of what we call the NYSC. Now the NYSC has reduced 2 years pupilage to one year because the one year you do in NYSC is considered as part and parcel of the 2 years privileged period for you. At the end of the two years you registered as an engineer in whatever profession you had decided to take.

In 1970 also the indigenisation decree came out and because of that there was lack of manpower in most of our industries and the federal government want to have indigenes of Nigeria handling this manpower problem in our industries. So in 1971 there was a decree No 47 establishing the industrial training fund and that decree asked ITF to promote and encourage the acquisition of skills in industry and commerce with a view to generating indigenous manpower. Really it means it has to be Nigerians doing the work for Nigeria.

And how will ITF achieve this, the federal government went on to say that any company that has workforce of 25 people should register with ITF and pay 1% of the payroll to ITF so that ITF can manage this assignment given to it.

Well the system still went on whereby you have the vacation job going and you also have the privileged period still going on just now in Nigeria because of certain changes of things in the country. In 1976 ITF introduced what is now SIWES; Student Industrial Work Experience Scheme. Now this is to give the students in the polytechnics and universities who are in the technological areas a chance to go and work in a company while they are still students in the school. Thereby they have the opportunity to blend what they are learning in the classroom to what is actually taking place in the industry.

International Spread of the Dual System

Dr Bauer of Dornier International Logistics told the Workshop that the United States and the UK are really going in the direction of the dual system; they are aiming at it on both sides - from the government and the industries. I do not know what is the reason but I heard and read it in the papers and they have really come to Germany to understudy it. Other countries that have implemented the dual system are Australia, Indonesia and Brazil. About funding: it is done primarily by industries. Of the 30 billion Deutschmark spent per year 80 per cent is provided by the industries. This gives a big breather and relief to government and this is one of the reasons why they try to turn away from government, and the industries say "we have to be the initiative for our investments in the future."

He told the Workshop that there is a need for co-operation among the trade unions, industries, governments and vocational training centres. The industries ought to take more initiative in these matters . I must say, from my ten years experience in Nigeria, that these people who are doing the job, the so-called blue-collared people, these are the people who are not at all recognised in the society, I tell you it is the other way round in Germany. We are very proud of the highest level of the vocational training centre. This is the so-called German master. He can in one person, according to the British system, replace several people.

He can replace the technician, he can replace the foreman and, to a very large extent, he can replace the engineer. These are the people who can carry on the production, maintenance of the whole economy in Germany.

Then the financial aspect just to make it clear is only involved carried by the government and the governmental institutions, 80% of the cost are carried by the industries. This is because the industries invest in their own future by investing in vocational training.

To be frank with you in Germany we have no oil to drill from our ground if we would have to have the chance for this I am too sure we would have invested it on technical education. One would like to urge all those who have access to the corridors of power to use their influence to drum into the ears of the powers that be to pay more attention to technical education. This is a very serious issue and I pity those who execute this training programme in different polytechnics, colleges and vocational training centres in view of inadequate facilities. The economic health of the country depends largely on a workforce that combines technical skill with knowledge.

Vocational and Technical Education in USA, Great Britain and Japan: Lessons for Nigeria:

Excerpts from Professor S O Olaitan's paper

Any study on comparative education cannot be complete without cross references and pin-pointing of lessons worth learning. In the .discussions on the development of Vocational education in the U.S.A., Britain and Japan, certain patterns could be isolated. Some of these patterns (or features) and the lessons they portend for Nigeria are highlighted as follows:

1. **Vocational Education is a Child of Necessity**
   The development of Vocational Education in America arose out of the need to develop weapons of war and dominate the world politically and economically. In Japan, Vocational Technical Education was catalysed by the effect of the war, desire for freedom from oppression by developed countries and the desire to overcome the impact of increasing population pressure. Reforms in the apprenticeship system were made inevitable by the industrial revolution while formal Vocational Education was necessitated by urgent needs for war weapons during the world war years. In Nigeria, the major catalysts for educational reforms have been perennial shortage of skilled manpower, high rates of graduate unemployment and prolonged economic recession.

2. **Vocation Education Programmes are Utilitarian and Dynamic**
   At any point in time, programmes of vocational education serve pressing local and national needs. These programmes are either modified or completely jettisoned as soon as these needs have been met or as soon as they are no longer tenable. With vocational education, as exemplified in USA, Britain and Japan, there are no eternal verities, no sacrosanct curricula and no fundamental curriculum. Programme offering is strictly based on needs and the best route to serving the needs as they arise amounts to the best curriculum. In Japan for instance, war technology was the focus of Vocational education during the world war era. Today, emphasis is on computer technology and electronics for home applications.

3. **Vocational Education as a Component of Basic Education**
   In U.S.A., and Japan, skill education is glorified over and above liberal education. The British education system which hitherto revered liberal education has shifted ground significantly in favour of vocational education due to stiff competition in the world of technology. Thus, skill education has now acquired the reputation of a necessity for all rathe

than the consolation of the poor masses. This is evident in the fact that basic education in developed countries is now considered incomplete unless the child has received occupational/vocational education. The introduction of vocational subjects into secondary school curricula in Nigeria via the National Policy on Education is consistent with this enhanced image. However, the paragraph of the policy which connotes that vocational education in Nigeria is meant for those who cannot stand the academic rigour of 6-year secondary schooling negates the spirit of this innovation.

4. **Promotion of Indigenous Technology Stimulates Vocational Education**
The experiences of U.S.A., Britain and Japan showed that vocational education keeps race with the level of technological development in the country. Courses and programmes offered depend on available technology rather than the universal level of technology advances. A country that depends on imported technology must aim to develop her own technology if industrial growth and concomitant expansion in vocational education must be sustained. Like in Japan, initial efforts may amount to imitation and adaptation, but eventually, the country would be able to develop her own technology and compete favourably in the production of new technologies.

5. **Consumption Patterns Affect Vocational Education**
The growth of Technology in Japan in particular showed that the consumption patterns of the people cannot be ignored in the search for industrial and economic development. The taste and fashion of the people must be such that encourage the expansion of local industries, stimulate industrial growth and consequently lead to increased demand for vocational education. If the consumption pattern is in favour of imported goods, efforts must be made to either produce those goods locally or encourage alternative consumption patterns that can be satisfied locally. Also, the people must be discouraged from developing a miserly and austere attitude to products of technology. Aggressive consumption of home-made goods stimulate industrial growth and leads to expansion in vocational education.

6. **Manpower Development is Central to Vocational Education**
In U.S.A., Britain and Japan, the primary objective of vocational education is manpower development. Consequently, manpower development agencies are fully involved in the management of vocational education. In Britain for instance, the manpower Service Commission is fully involved in the sponsorship and funding of vocational education.

The involvement of relevant manpower development agencies is particularly necessary in order to ensure that training programmes align with manpower needs. The manpower development agencies furnish the training institution with manpower surveys, assist in the placement of products and contribute to the funding of programmes.

7. **Evaluation of Vocational Education is Performance-Based:**
In the course of their development, countries such as the USA and Britain have long realised that evaluation must focus on the objective of the programme to ascertain whether the objectives are realised. Consequently, the evaluation of students' learning in vocational education in these countries is through performance-based tests rather than achievement tests. The ineffectiveness of certain vocational subjects in the Nigerian school systems is partially due to the use of achievement tests rather than performance-based tests.

8. **Diversification of Funding is Desirable:**
In USA, Britain and Japan, the funding of vocational education is a shared responsibility of all arms of government and industry. Each Local, State and National government makes specific contributions to the funding of vocational education. Through special levies and other legal requirements, firms which utilise the products of vocational education are made to participate in its funding. Funding of vocational education in Nigeria is at present ineffective because the Federal Government is almost entirely responsible.

Suggestion for Improvemennt

On the basis of the lessons learned from the development of vocational education in the USA, Britain and Japan, the following improvements are desired in Nigeria:

1. The philosophy and objectives of vocational education should be revisited to ensure that prevailing needs are served. In these days of prolonged economic depression, vocational education should aim at returning the country to a sound economic footing rather than self-reliance. A nation first has to survive well in this competitive world before aiming at self-reliance.

2. The current approaches to curriculum development in vocational technical education at the secondary school level needs to be re-examined and harmonised. In the mainstream secondary school vocational subjects such as agriculture are treated as the pure sciences in content arrangement and methodology. In technical colleges however, vocational subjects are treated more as practical arts and learning by doing is fostered. Improvement in secondary level vocational education would require that approaches to curriculum development which foster learning by doing are adopted.

3. The concept of industrial training for tertiary level students of vocational education needs to be revisited. As a result of the way the ITF is conducted, students often find themselves in jobs which bear no direct relevance to their training and which do not assist them in their occupational goals. At the end of their training many graduates discover that they are yet to acquire the competences and confidence which exposure to practical work should help them acquire. The concept of work experience should replace our

understanding of industrial training so that persons in training can be exposed to practical work situations that are directly relevant to their education and occupational goals.

4. The improvement of vocational education in Nigeria can only be sustained through active research and development activities. In the countries studied in this paper, many research institutions service the developmental needs of vocational education. In Nigeria however, no institution exists that has a specific mandate to conduct research and development studies in vocational education. The NBTE and NERDC make impacts commensurate with their manpower and funds but considering the importance of vocational education in the world today, a full-fledged centre for vocational-technical education research is desired. This centre should be charged with the responsibility for:

a. Appraising the effectiveness of curricula for all vocational technical subjects or programmes.

b. Conducting and sponsoring research on the impact of vocational technical education on the economy.

c. Developing instructional materials for vocational technical education.

d. Monitoring developments of vocational education around the world and within the country and their implications to National interests.

e. developing and testing innovative approaches to vocational education.

5. In the wake of heightened unemployment in the mid-1980s, the National Directorate of Employment (NDE) was set up to assist young school leavers under artisans and apprentices. Most times, these artisans are persons who have no formal education while the apprentices find themselves learning trades which are irrelevant to their previous education. This leads to the production of new artisans who cannot do better than the masters who trained them. The needs of these school leavers would be better met by establishing Vocational or Occupational training centres to provide formal vocational education in relevant occupational areas to both school leavers and artisans. Products of these centres, more especially the artisans can establish on their own while a few can serve as technicians to pre-vocational subjects in junior secondary schools to make these programmes effective. The proposed Vocational or Occupational Centres will also serve to meet the training Needs of Adults, a situation so much valued in Japan and U.S.A.

References

1. Edmund, J.K. (1979). Other Schools and Ours. Comparative Studies for Today. Printed in Great Britain by Billing & Sons Limited. Gueldford, London, Oxford, Worcester.

2. Federal, Ministry of Education (1981). National Policy on Education. NREDL.

3. Layton, S.H., Charles, A.P. & John, C.W. (1962). Development of Vocational Education. London. The Technical Press Limited.

4. Malkova, Z.A. (1988). International Year book of Education. Secondary Education in the World. Vol. XXXIX. Published by United Nations Educational, Scientific and Cultural Organisation (UNESCO). Printed in Switzerland.

5. Star, Harold & Diaffenderger (1970). A System for State Evaluation of Vocational Education Columbus: The Centre for Vocational Technical Education. The Ohio State University.

6. Towe, P.E.O. (1985). Technical & Vocational Education Programmes in Nigeria - in NERDC (ed) Comparative Educations for Nigeria (1985).

7. Wenrich, R.C. & Wenrich, J.W. (1974). Leadership in Administration of Vocational Education. Columbus, OHIO; Charles E. Marrll.

8. Wallace J.D. (1975). A Comparison of Procedures for Education and Vocational Education Programmes. RCU Research Series No. 45 Knoxville: Tennesse Research Co-ordinating Unit.

UNESCO's Contributions to the Development of Technical and Vocational Education System: The UNEVOC Project

By Hans Kronner

In the first part of my presentation, I should like to explain the specific approach of UNESCO in the development of technical and vocational education, particularly as compared to other international organisations. I thought this might be useful because not all of you might be familiar with the activities of the United Nations family in this field.

Secondly, I will give you some information on the UNEVOC Project of UNESCO and on its main lines or work.

Finally, I would like to explain what UNESCO and its Member States consider as essential elements of any system of technical and vocational education in any country.

Roles of UNESCO and of other UN agencies in Technical and Vocational Education

This Workshop is devoted to technical education in Nigeria. UNESCO, of course, considers it as one component of a broader action aimed at the enhancement of education systems on a world-wide scale.

Within the system of the United Nations, several specialised agencies are active in the field of technical and vocational education. The Food and Agricultural Organisation (FAO) deals with training in agriculture; the World Health Organisation (WHO) is concerned with training in the medical sector. Agencies like the International Bank for Reconstruction and Development (IBRD, World Bank) or the United Nations Development Programme (UNDP) deal with technical and vocational education projects as well.

Most of the programmes in technical and vocational education are carried out under the responsibility of two United Nations agencies; the International Labour Organisation (ILO) in Geneva and United Nations Educational, Scientific and Cultural Organisation (UNESCO) in Paris.

Both organisations, the ILO and UNESCO, have their own specific approaches to technical and vocational education.

The focus of the ILO activities is on labour market and employment aspects of technical and vocational education. Member States at the ILO are represented not only by their

governments - normally by the Ministry of Labour - but also through employers' organisations and trade unions.

UNESCO, on the other hand, has a specific mandate in matters of technical and vocational education as a component of the education system, and the emphasis is on education system.

The UNEVOC Project

The decision to start this project was unanimously taken by the General Conference of UNESCO, that was attended by more than 160 Member States, late in 1991, it was also decided unanimously that UNESCO should attach higher priority and devote more resources to technical and vocational education.

Member States decided to launch an International Project on Technical and Vocational Education. In 1992, the Government of Germany offered to host the UNEVOC Implementation Unit in Berlin. As Dr. Ogunbadejo will remember, the Unit in Berlin was officially opened in September 1993.

According to the decision taken by Member States of UNESCO in 1991 and confirmed last November, the UNEVOC Project will work in **three Programme Areas.**

The **first Programme Area** deals with international exchange of experience and studies on **policy issues.**

This very Workshop is actually an example of an event that is devoted to policy issues on the system level.

The basic question behind this **Programme Area A** of the UNEVOC project, is:

What are the factors that determine the role, the status, and the attractiveness of technical and vocational education within a national educational system?

You might be aware that in many countries technical and vocational education is not considered as an integral part of the education system, but is left outside more or less. In many cases technical and vocational education is left to private initiative; there is a lack of government support and an official policy in technical and vocational education.

In such cases, quite naturally young people are less inclined to attend programmes of technical and vocational education; rather, they will try to continue general education as long as possible, with a view to eventually entering higher education.

What are the factors that determine the role, the status, the attractiveness of technical and vocational education in an education system?

We held a consultation last year with experts from different world regions in order to examine this question. The participants - and I am happy to say that Dr. Ogunbadejo was one of them - identified a number of examples:

Role, Status and Attractiveness of Technical and Vocational Education

One of the factors that determine the role of technical and vocational education is close **cooperation between the educational authorities** on one side, **and enterprises**, employers organisations, and trade unions on the other. There should be a well-organised dialogue and cooperation.

Where this dialogue and cooperation do not exist, in many cases the output of technical and vocational education does not match the needs of the economy, thus reducing the relevance of technical and vocational education.

Another factor is: What are the **social attitudes** towards technical and vocational education? Is there social prejudice? Is there still this traditional classification into white-collar jobs with high prestige, and into blue-collar jobs with low prestige? What are the consequences? What can be done to improve the situation?

What are the causes that in some countries only drop-outs from general education would even consider entering vocational training? Apparently because the prestige of technical and vocational education is much lower than that of general education.

Another factor is: Are teachers and trainers in technical and vocational education sufficiently qualified both technically and pedagogically? Are there any defined **qualification standards for teachers** as well as for trainers?

Another factor has often been mentioned on behalf of countries with shortages of employment opportunities: Does the vocational curriculum include any **entrepreneurial skills?** Where managerial and self-employment skills are included in the programmes, technical and vocational education will certainly be more attractive.

Another factor is **articulation** between technical and vocational education on one side, and general and higher education on the other. To illustrate what this means: Can a well qualified skilled worker, after a couple of years of work in his profession, eventually enter higher education, or will one be denied access just because of some formal requirements in general education that have not been met?

Another very important factor governing the quality and attractiveness of technical and vocational education is: What is the **cost of training,** and who pays for it? In some countries, you could find the answer to this question in newspaper advertisements, where private companies offer vocational training at considerable cost.

In other countries, government provides educational institutions and courses for technical and vocational education, and the cost is covered from public funds, just as in general education.

In other countries, private companies offer training, and will sometimes even pay a training allowance during the training period.

If general education is free of charge, while individuals have to pay for technical and vocational education, it is evident that technical and vocational education is less attractive.

There is still another factor that is not necessarily part of the system of technical and vocational education itself: **Vocational guidance.** If, during general education, young people are not even informed of options in technical and vocational education, how can we expect them to take advantage or it? In many education systems, there is no systematic career guidance and counselling of young people attending general education about options available in technical and vocational education.

This list of factors that has been compiled in our recent consultation is not at all exhaustive. Let me add one more example.

For several years, countries like Australia or the Republic of Korea have been making efforts to introduce systems of nation-wide recognised **examination standards and certificates** in technical and vocational education.

Once such a system has been introduced, someone who has undergone technical and vocational education in one particular region or even company may be sure that this certificate will be recognised by any other company in any other part of the country. This of course is another element that determines the attractiveness of technical and vocational education.

Within the UNEVOC Project, we are currently preparing a series of **case studies** on the relevance of the factors that I have mentioned. As soon as these case studies have been finished, the experiences gathered will be made available to all interested countries.

The **second Programme Area** of the UNEVOC Project is devoted to strengthening national **research and development capabilities.** You will be aware that in some countries well developed infrastructures in technical and vocational education are available, for ex-

ample for curriculum development, for the design of courses, for the definition of examination standards, etc. In other countries, such infrastructures are missing. It is up to the individual institution or even trainer to develop curricula or courses.

It is clear, however, that quality technical and vocational education cannot be developed just at the desk of the ministry or in individual training institutions. There is a need for some infrastructure and some research and development capability in the particular country. UNESCO will see to strengthen these research and development capabilities.

In this **Programme Area B,** we recently held a workshop that gathered experts from all world regions. Participants compared different **methods of development of vocational curricula.** The results are presently being evaluated in the world regions. We encourage curriculum developers in technical and vocational education to go into existing enterprises and examine existing jobs so that qualifications required at work and the changes to be expected in the near future, can be defined as clearly as possible.

We want to convince educators that it is not enough, in technical and vocational education, to teach isolated subjects such as welding, drawing, or accounting. Quality training will also include the performance of more complex operations that include the combined application of skills and knowledge in different fields.

Job analysis at existing workplaces is certainly one of the most important sources of information for the development of adequate curricula.

We are about to describe methods applied and experiences gathered in the process of **international transfer and adaptation of existing curricula.** Differences in technologies applied, in norms, in legislation etc. have to be taken into account when curricula are to be adapted to a new environment.

The **third Programme Area** of UNEVOC deals with access to **data bases and documentation** in its broadest sense. If a curriculum is available, e.g. for sewage disposal, in one Spanish speaking country, why should another Spanish speaking country start to develop such a curriculum anew? However, such duplication of work seems to occur quite often, simply because those who would need the curriculum often do not know that it is available elsewhere.

This **Programme Area C** will be devoted to transparency of information and to access to databases and documentation. UNEVOC will not compete with other documentation centres, but rather assist Member States to efficiently use existing data and documentation.

In addition to that, we will attempt to enhance communication amongst the specialised institutions in Member States.

We are about to process an **inventory of** national and regional **institutions** active in **planning**, research and development in the field of technical and vocational education. We have so far received replies from almost 100 institutions in the field of technical and vocational education that wish to cooperate within the UNEVOC network. Once we have identified the key institutions that will act as a focal point of UNEVOC in each country, the data will be made available to all countries.

This spring, we will start with an international UNEVOC **information letter** in English and French, that will be published on a quarterly basis. We will collect and disseminate information on events, on conferences (like this event in Nigeria); on international training seminars, on publications, and so on.

This information letter will also contain more detailed features of institutions that are participating in the UNEVOC network - institutions that are working in the field of infrastructure, development, planning and research of technical and vocational education. The purpose will be to facilitate communication and cooperation among specialised institutions.

There will be a substantial **international publication on key issues** of technical and vocational education, that might be appearing once or twice a year. This publication will concentrate on policy issues, on findings of studies, research, and meetings on selected issues.

We will also disseminate relevant **computerised data.** We will use electronic communication to the extent possible, and also disseminate data on floppy disk.

We are aware that adequate equipment will not be available in all countries. In some cases, we might be assisting our partners institutions to purchase such equipment if necessary.

What is the purpose - the overall objective - of this Programme Area C?

The overall objective is to facilitate **access to information** in the field of **planning, research and development** of technical and vocational education. We want to support the work of relevant partners and institutions in Member States of UNESCO, and at the same time to avoid duplication of work.

Let me say a word on the **financial resources** available for the UNEVOC Project.

UNESCO has a regular budget for technical and vocational education that is very limited. It is less than the budget of one single medium-size vocational school in an industrialised country.

What can UNESCO do under such budgetary restraints?

UNESCO develops proposals for projects that can be submitted to funding agencies. UNESCO assists in the implementation of programmes that are sponsored by third parties, such as this Workshop on Technical Education in Nigeria that is sponsored by Dornier Logistics International, a private company.

In 1992, UNESCO and Germany signed an agreement on UNEVOC. According to that Agreement, every dollar that UNESCO invests into the UNEVOC Project from its regular budget will be supplemented by a second dollar from Germany. This doubles UNESCO's budget for UNEVOC. In addition to this, Germany covers the cost of infrastructure of the UNEVOC Implementation Unit in Berlin; that is office rent, the premises, and equipment.

Altogether, this means that UNESCO's influence and impact goes far beyond its own limited financial resources.

In UNESCO's view, it is important that initiatives on the training level do not neglect standards and compatibility within the respective countries.

I would like to give you some indication as to what Member States of UNESCO consider essential elements of a **framework of technical and vocational education.**

In 1989, Member States of UNESCO adopted a **Convention on Technical and Vocational Education.** This Convention provides a set of guidelines that should be observed in the development of technical and vocational education in any country. I should like to refer to some of these guidelines to illustrate their character and their relevance.

The **first set of guidelines** concerns **objectives** of technical and vocational education.

Member States of UNESCO agreed that each country should define a general framework. This framework should indicate the objectives to be obtained in technical and vocational education. The economic, the social, but also the cultural development needs. The personal fulfilment of the individual should be taken into account.

The framework should also indicate the relationship between technical and vocational education on the one hand, and other types of education on the other, with particular reference to horizontal and vertical articulation of programmes.

In any national set-up, the roles of the public authorities responsible for economic, social and development planning in the various sectors of the economy should be clearly defined.

Where applicable, professional associations, workers, employers and other interested parties should be involved.

UNESCO also pointed out that no individual shall be discriminated against on the grounds of race, colour, sex, language, religion, national or social origin, political or other opinions, economic status, birth, or on any other grounds, when seeking access to technical and vocational education.

The States also agreed to pay attention to the special needs of the handicapped and other disadvantaged groups and take appropriate measures to enable these groups to benefit from technical and vocational education.

A **second set** of guidelines deals with **content and structures** of technical and vocational education.

The content should take account of the educational, cultural and social background of the population concerned and of its vocational aspirations.

The programmes should of course cover the technical and professional skills, knowledge and levels of qualification needed in the various sectors of the economy, and the technological and structural changes to be expected.

Of course, employment opportunities and development prospects at the national, regional and local levels should be kept in mind, not only in the company or on the local level, but also on the national and regional level.

The protection of the environment and the common heritage of mankind should also be incorporated in programmes of technical and vocational education.

Furthermore, technical and vocational education should be designed to operate within a framework of open-ended structures within a context of life-long education.

It should provide, even in the context of general education, an introduction to technology and to the world of work.

It should necessarily provide for vocational guidance, information and up-to-date counselling for the individual.

Of course, programmes should also include the necessary knowledge and know-how needed for a skilled occupation.

They should form a basis for occupational mobility, for improvement of professional qualifications, and for updating of knowledge, skills and understanding.

Furthermore, UNESCO says that even those who undergo initial vocational training in a company, i.e. outside the educational institutions, should be offered complementary general education by the public education system.

Continuing education and training courses for adults are also required; in particular to retrain and to supplement and upgrade the qualifications of those whose current knowledge has become obsolete because of scientific and technological progress or changes in the employment structure or in the social and economic situation.

UNESCO also recommends Member States to render support and advice to undertakings outside the educational institutions, if they are willing to participate in co-operative programmes of technical and vocational education.

I should like to mention a **third set of guidelines** which concerns the **teaching staff in technical and vocational education.**

UNESCO believes that all persons teaching in technical and vocational education, whether working full or part time, whether in schools or companies, should not just have adequate theoretical and practical knowledge in their professional field, but should also have appropriate teaching skills consistent with the type of level and course that they are required to teach.

Teachers and other specialised staff in technical and vocational education should be granted employment conditions that make it possible to attract, recruit and retain qualified staff in their areas of competence.

Finally a **fourth set** of the UNESCO guidelines concerns **international cooperation.**

The UNEVOC Project is UNESCO's major activity aimed at promoting international cooperation in technical and vocational education. I have already explained to you our basic concepts and approaches. But I should also like to give you an example of what Member States can do.

Member States should make use, in their technical and vocational education curricula and programmes, of international technical standards applied in industry, commerce and other sectors of the economy. I am mentioning this example because international cooperation in technical and vocational education is not something that can take place within the UNESCO Secretariat. It is the Member States who constitute UNESCO, and it is their cooperation that we want to support.

To summarise, UNESCO's message is as follows: If technical and vocational education is to fulfil its role in any country, it will not be sufficient to promote initial and continuing training activities alone.

Attention has to be paid to the development of a suitable **framework of educationa policy,** to the building of capacities for **planning,** for **research,** for **development,** for teache training, for training of trainers, and other aspects of **system development.** This is normally recognised in general education; however, in technical and vocational education, there ar still some miles to go - in developing as well as in industrialised countries.

UNESCO is prepared to assist Member States in this task as much as possible.

Implementation of Manpower Training Programme in Private Industries:

a. Mercedes-Benz ANAMMCO

Paper presented By **E.O. Ugwu;** *Deputy Manager (Training)*

Initial technical and vocational training efforts of Mercedes-Benz ANAMMCO was aimed at developing the training objectives for the pioneer employees Mercedes-Benz ANAMMCO. The training programmes included provisions for psychological, philosophical and sociological aspects to prepare the participants for the industrial environment and unending challenges they will be exposed to after training.

The implementation of the training laid much emphasis on practical training; group project methods and documentation of experiences by each participant. The training programmes have been expanded in scope over the years. Foremen and supervisors training schemes and apprenticeship programmes are now offered in automobile, mechanical electrical/electronics, welding/fabrication engineering by the training school.

Anammco has established linkages with some Federal Government agencies like NDE in manpower development through open apprenticeship scheme to reduce youth unemployment.

Responding to the changing status of Mercedes-Benz Anammco and technology the training programme has been extended to include re-training of trainers. This presently is undertaken by sending some of the trainers abroad to the parent industry Mercedes Benz A.G. of Germany.

b. Volkswagen of Nigeria Limited

Paper presented by **E. Ileybusi**

Volkswagen of Nigeria believes in well educated workforce, hence importance is given to training of skilled technical personnel. Their training school was established at the same time as the plant.

The craft training lasts for three years.

The training school concentrates in the training of craftsmen key trades relevant to the industry. The trades which are taught therefore needed auto-mechanic, auto-electrician, fit-

ter-machinist, electrical installation and tool-making. The training organisation of Volks is geared towards meeting the need of the plants as well as the need of the individual hence a national certification system by City and Guild examination, is now being introduced.

Implementation of Manpower Training Programme in Governmental Organisations

(An Example of Dornier Training Support to the Nigerian Navy)

By Captain M.O. Bakare BSC (Engr.) MNSE FSS, PSC+

Captain Bakare who delivered the papers said that the history of manpower training and development has gone through many stages and as the Navy service became more sophisticated and more demanding, officers were sent abroad to train in more established Navies.

With the growth of the Naval fleet came increase need for well-trained technical manpower which was becoming too expensive to train abroad. In 1982, therefore, by arrangement with the International Military Service (IMS) Limited of the U.K. the Nigerian Navy Technical School at Port Harcourt was established when that training contract ended, Messrs. Dornier took over and the Nigerian Navy Technical Training Centre (NNTTC) started operation in Sapele in September 1985. The Naval Dockyard Apprentice School (NDAS) which was established to provide the Civilian manpower to man the Dockyard was later merged with the NNTTC to save costs. The training objective of the base is geared towards the production of highly skilled technical personnel. Courses are offered in two main categories of technical training for officers and ratings.

Gains of Localisation.

As a result of the localisation of Technical training, the Nigerian Navy has the opportunity to fashion training goals and needs to meet their overall objective. The NN as a result of the localisation is also able to train a large number of personnel at the same time. This has also helped in the conservation of foreign currency.

Implementation of Manpower Training Programme by Governmental Organisations

The Rector, Federal Polytechnic, Kaura Namoda presented the Workshop with some of the problems and process of implementing technical manpower training programme through inter-governmental organisations.

He argued that technical education in Kaura Namoda had not really started. As he said:

I want to share our experiences in our effort to start technical education. The first step in this attempt was the acquisition of equipment from Czechoslovakia. Many institutions had problems in connection with the equipment supplied by Czechoslovakia and other countries. The siting and equipping of the Federal Polytechnic, Kaura Namoda, is an example of how hapharzard technical education was being planned.

There is no technical manpower to run most of the technical courses. In many cases we have a lot of engineers, a lot of scientists who are very proficient in laboratory work but nothing to do with actual practical work. A situation where we have a lot of laboratory equipment and a lot of people who can carry out experiments in the lab but they cannot perform practical work in the workshops deserve serious attention.

The equipment arrived in Kaura Namoda at a time the foundations of the actual workshops for the equipment were yet to be completed. The equipment had to be in the rain and sun for sometime before the first laboratory, a mechanical workshop was constructed. A lot of the equipment, after installation, were found to be heavy industrial equipment which can manufacture virtually anything. We didn't have the technical manpower to operate the machines and there was no electricity to run them. This was a problem of planning. We didn't know the political reasons for the establishment of the polytechnic in Kaura Namoda since the town had no electricity connection to NEPA; there was no water and other facilities. We were sited there and our job as education managers was to do the best we can.

Several recommendations emerged to the discussion:

a. Skilled manpower should be in place to operate laboratory equipment. We may follow the example of a country which agreed to do the theoretical work and imported expatriate to work in the workshop since in Nigeria we have a lot of people with theoretical work without practical skills.

b. Technicians who are working in the workshops and laboratories should be regularly trained because technology is not static. It is not enough to send only the lecturers for seminars, conferences and workshops. Maybe we should send the technicians in the workshops for special training from time to time to be updated in modern technological changes.

c. The Chairman of the session said that the siting of the Federal Polytechnic, Kaura Namoda, may not be as arbitrary. The decision to site it there seemed to be the political decision to have a federal presence. Afterall it was an important rail terminus for the shipment of groundnut, beans, onions etc to the ports to earn foreign exhange at that time. The siting might be to use the Polytechnic as a development agent.

d. The supply of industrial machines might have also been deliberate because of the limited facilities for industrial training. It was felt that in addition to having the normal basic training some of the industrial machines would be used for manufacturing purposes. What might be needed now is getting creative staff in mechanical engineering field who can operate these machines and use them to the best advantage of the institution and the environment.

On power supply, it was suggestead that the place is not too far from Gusau where the NEPA grid is. One would believe that with time, a little more pressure on government, NEPA light would get to Kaura Namoda. The two giant generators at the Polytechnic could be rationalised for lab and workshop use.

Technical Education - The Way Forward

After each paper presented and the incisive contributions by discussants and chairmen of sessions, the participants, who remained alert throughout, in spite of the fasting season of the two main religions, suggested many ways by which technical education could be improved.

From these frankly expressed suggestions a 15-point communique read at the closing session was compiled. The communique has formed the core of the **Observations and Recommendations** listed in this concluding chapter.

The following is a review of contributions to the topic - Technical Education: WHICH WAY FORWARD? They cover the following:

a. General national apathy to technical education.
b. Funding of technical education.
c. Lack of equipment for practical training.
d. Sharing of Available Technical Training Facilities.
e. Teachers for Technical Institutions.
f. States School Boards for Technical Colleges.
g. National Planning for Technical Education.
h. National Crusade for the Improvement of Technical Education.

General National Apathy to Technical Education

A participant suggested that there is a need for a national campaign to re-awaken the people about the significance of technical education, if we must save it from total collapse. He suggested that the Federal and State governments should come together to set up a national panel or commission as it is done for other crucial national matters. This is the only way to "save technical education from total collapse."

Technical education, he argued, should not be perceived as the path for the dropouts. He contended that it should be seen as one of paths by young people to the attainment of their objectives in terms of status and self-actualisation and not a dead-end path. This can be done by ensuring that the admission structure into technical institutions is reviewed by getting the best brains into polytechnics and technical colleges. If the admission is improved and the pay structure for the technical products is improved, the best would be attracted. Some other

participants contended that there is a gradual shift of preference toward technical education as some best and brightest are now making it their first choice.

'This new trend, a contributor pointed out, does not signify that there would be a quick solution to the apathy towards technical education because it is not seen by most as the normal base through which people can aspire to be something. It was contended that a number of people who are today in positions of authority did not go through technical education. With time, atttitude to technical education will improve But while educating the public about the crucial importance of technical education, efforts should be made to improve the fortune of technical education.

A participant lamented that the people in the technical field are generally sidelined in the affairs of the nation, especially in policy-making. Consequently people who are interested in technical education or the development of technical education do not have the weight or the clout to do much to influence policy and to redress the poor attitude to technical people. Perhaps, he said, one day a technically-trained person would be in the topmost decision-making position in the country.

It was also argued that there is abundant evidence of elitism in favour of liberal education to the detriment of technical education. He querried: Who takes decisions over technical education? People who have gone to the universities. All of them prefer to have their kids go to universities also. This is why those who decide on allocation of funds in the ministries of education put the largest shares in favour of regular secondary education and universities where their children are and give pittance to technical institutions. He condemned the undue bias by decision-makers against technical education.

Another participant said the lack of confidence in the Nigerian engineers is another example of the widespread negative attitude to technical education and the product of such form of training. He gave the example of his Nigerian friend who working for an American electrical conglomerate which designed one of the power stations in Nigeria. This Nigerian engineer designed the security system of the power station. When that station had a problem the Nigerian engineer was brought down to sort out the problem. A big official in the ministry concerned refused to see the Nigerian. It was finally found that the problem which kept the power station out of action was a minor one. The participant said ruefully that the refusal of the official to see the Nigerian engineer who actually designed the system is typical of the attitude to the Nigerian engineers and such attitude ought to be corrected.

Funding

It was observed that the funding of technical education in Nigeria has become very arbitrary. A budget of N100 million may be submitted and only N5 million would be approved. It was a concensus that technical institutions, especially technical colleges require special grant to provide a very sound foundation for technical education in Nigeria. A matching grant to all technical colleges was suggested.

As a way of solving the problem of funding, a participant suggested that, what he perceived as duplication in the technical education system should be eliminated if only the Federal Governmnent could concern itself with policy formulation and maintenance of standard of technical education through its agencies such as the National Board for Technical Education, the National Commission on Colleges of Education and so on. The running of the schools themselves should, thereby, be left in the hands of the States. This way, it was reckoned, the meagre resources we have could be channelled into a particular direction. "What we have today is Federal Government giving us the policy, Federal Government controlling and running schools."

On the funding of technical education, several participants suggested that the private sector should contribute more to funding technical education, as a way of contributing to the their own future. Besides the 2 per cent pre-profit tax from industries for education, which should be ploughed into technical education, the private sector, it was suggested, should sponsor programmes in some of our technical colleges, particularly programmes that are related to their needs. At the end of the day they are going to use the products of the training institutions. It was maintained that there is no reason why ANAMMCO and other automobile assembly companies should not sponsor programmes in automobile engineering in polytechnics or technical colleges nearest to them.

It was also suggested that financial institutions should finance graduates of technical institution\ for self-employment so that they could set up their own cottage industries. Participants were however reminded that such institutions as the Community and People's Banks were set up to help those who might want to set up their own small businesses.

Lack of Equipment for Practical Training

Several participants spoke very strongly about how inadequate funding has led to lack of adequate equipment for practical training in technical institutions. Many of them made reference to the equipment lists recommended by NBTE for different technical courses before accreditation could be granted. Many of these equipment requirements are not yet fulfilled by most technical institutions, especially technical colleges.

A suggestion was made that the Federal Government should consider giving a concessional matching to all the 120 technical colleges in Nigeria including the Federal technical colleges, since they are the foundation of technical education. They argued that any building that is built on a weak foundation shall collapse and that technical colleges should be centres of excellence.

Sharing of Available Techincal Training Facilities

The Workshop examined how the Polytechnics and Technical Colleges could, as part of sharing scarce facilities, have controlled access to the impressive technical training facilities which Dornier has helped to install at the Nigerian Navy Technical School, Sapele and the Nigerian Air Force (TTG) Kaduna.

The participants were told that for some time now the NBTE had been considering curricula for Maritime Engineering and Aeronautical Engineering and related fields. It is expected that both the Nigerian Navy and the Nigerian Air Force would be contacted to assist the Board.

Teachers for Technical Institutions

The Workshop was reminded that one of the major determinants of the status of technical education in any country, according to the UNESCO presentation, is the quality of the teaching staff. They should be Master Craftmen, knowledgeable not only in their own areas but in other areas as well. They must also be versatile, experienced in industry, and be innovative. In other words, the major determinant of the performance of the products of technical colleges and polytechnics in industry is the quality of the teachers.

The present quality of teachers in technical institutions, was regarded by concensus as most frustrating, especially in the technical colleges. It was observed that only two out of the eight NCE (Technical) Colleges are producing Master Craftmen and only ten of them could be produced in a year. In addition, there is no guarantee that all of them will want to teach in view of their preference to go into industries to work. It was therefore suggested that four of the NCE (Technical) College be dedicated to producing Master Craftmen who will teach in technical colleges.

States School Boards for Technical Colleges

In view of the many problems confronting the State Technical Colleges, it was suggested that State Schools Boards should be set up for them for coordination and addressing these

problems. This will be in accordance with the recommendations of the NBTE for accreditation of Technical Colleges. It was argued that each technical college may not have a separate board. Rather a group of technical colleges in a state may have one Schools Board. A lot of problems of these colleges could be solved that way. An appeal was made to the Federal Ministry of Education to tell the Commissioners for Education in States that they are to comply with this NBTE recommendation.

Planning for Technical Education

Several participants suggested that the way forward with regards to technical education is planning. This has to take into account the profile of the industries in Nigeria, their manpower demand structure and how to train such manpower.

National Crusade for the Improvement of Technical Education

There was a consensus that technical education is facing a big crisis. And in view of the importance of technical training to the economic health and the development of the nation, there is a need for a crusade to alert the nation about the need to salvage technical education from its present doldrums. It was concluded that in this most important national enterprise all the levels of government, private industries, communities, individuals philantropists and parents have roles to play. They should be enlightened about the issue and TAKE ACTION.

Summary of Observations and Recommendations

(i) There is need for more involvement of industrial establishments in the planning and implementation of Technical/ Vocational Education.

(ii) Efforts should be made to ensure that Technical Teachers have appropriate qualifications as well as adequate exposure to practical work experience.

(iii) Relevant Government agencies responsible for Technical and Vocational Education should be fully involved in the preliminary evaluation and establishment of new Technical/ Vocational Institutions.

(iv) In siting Technical Vocational Institutions, the availability of basic infrastructure such as water, electricity and access road etc. should be ensured.

(v) Technical/Vocational Institutions should be provided with adequate facilities to enable them train adequate intermediate manpower to meet a ratio of 1:4:30 for Professional to Technician to Craftsmen.

(vi) Monitoring of standards and accreditation schemes should be continuously embarked upon to ensure the maintenance of quality of products.

(vii) Adequate funding for Technical/Vocational institutions should be ensured by exploring additional avenues; such as industries, philantropists, local communities etc. in addition to Government efforts.

(viii) Appropriate atmosphere should be created by Government to encourage industrial establishments to sponsor/undertake research programmes in Technical/Vocational institutions in the country.

(ix) Federal Government policy in staff remuneration should be based more on competence and productivity rather than paper qualification

(x) Vertical and Horizontal mobility of products of technical/vocational institutions should be ensured.

(xi) The educational structure of the country should ensure unhampered academic progression for products of technical institutions.

(xii) The pre-vocational courses at the secondary level should be reviewed to ensure they are vocationally inclined.

(xiii) Curriculum for technical institutions should be constantly reviewed to take cognizance of new and emerging skills.

(xiv) Industries/organisations with adequate facilities for practical training should be encouraged to complement such practical training by arranging for relevant theoretical training for the trainees in Technical/Vocational institutions.

(xv) The Federal Government should make the establishment of Technical/Vocational education Board mandatory for states.

(xvi) All Polytechnics in Nigeria should run the core engineering programmes of civil, mechanical, electrical/ electronic engineering.

(xvii) The proprietors of new Technical/Vocational Institutions should be made to comply with the provisions of the Education Amendment Decree 9 of January 1993 which requires such proprietors to make available a minimum of ₦100m for capi tal development of such Institutions within the first five years of its existence.

(xviii) Required infrastructural facilities and appropriate buildings to house equipment should be provided on schedule whenever Nigeria enters into any bilateral agreement on Technical/Vocational Education.

(xix) A national advisory committee should be established to sensitive the proprietors and the public in the need to adequately fund Technical Education to save it from total collapse.

(xx) Technical/Vocational Institutions' programmes should include inculcation of entrepreneural skills on the students to facilitate their involvement in self employment through the establishment of their own small scale industries.

Members of the Organising Committee

1. Engineer Musa Abdullahi - Federal Ministry of Education and Youth Development
2. Dr. T. A. Ogunbadejo - Federal Ministry of Education and Youth Development
3. Mrs. E. O. Babaniji - Federal Ministry of Education and Youth Development
4. Dr. Klaus Bauer - Dornier
5. Mr. Joerg Dressler - Dornier
6. Mr. Andreas Weber - Dornier
7. Mr. Tony Asoro - Dornier
8. Chief S. C. Odumah - National Board for Technical Education (NBTE)
9. Mr. C. B. Onigbogi - Federal Ministry of Education & Youth Development - Secretary

Members of the Planning/Implementation Committee

1. Dr. Chief T. A. Ogunbadejo - Federal Ministry of Education & Youth Development
2. Mr. L. K. Kolapo - Federal Ministry of Education & Youth Development
3. Mr. E. O. Babaniji - Federal Ministry of Education and Youth Development
4. Mr. E. J. Okon - Federal Ministry of Education and Youth Development
5. Dr. Klaus Bauer - Dornier
6. Mr. Joerg Dressler - Dornier
7. Mr. Andreas Weber - Dornier
8. Mrs. P. N. Omogiafor - National Business and Technical Education Board (NBTEB)

9. Chief S. C. Odumah - Nationa Board for Technical Education (NBTE)

10. Mrs. Joyce Boloko - Federal Ministry of Education and Youth Development

11. Mr. Jack Deen - NCCE

12. Mr. Tony Asoro - Dornier

13. Mr. C. B. Onigbogi - Federal Ministry of Education and Youth Development

Official Rapporteurs:

1. Chief S. C. Odumah	National Board for Technical Education (NBTE)
2. Arc. A. O. Aimola	National Board for Technical Education (NBTE)
3. Mr. B. C. Onigbogi	Federal Ministry of Education and Youth Developmen
4. Mrs. Joyce Boloko	Federal Ministry of Education and Youth Developmer

Desktop Published by: **Enclair Publishers**
Printed by: Negro Ind. Press Nig. Ltd.

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement (OERI)
Educational Resources Information Center (ERIC)

NOTICE

REPRODUCTION BASIS