THE NEED FOR PRACTICAL AND COGNITIVE SKILLS FOR EMPLOYABILITY OF TECHNOLOGY GRADUATES

By

ISYAKU MOHAMMED DABBAN
Department of Education (Technical),
Kaduna Polytechnic,
Kaduna.

And

Dr. MUHAMMED ALIYU
Department of Education (Technical),
Kaduna Polytechnic,
Kaduna.

Abstract

In every society be it primitive or modern, people need to develop their knowledge and skills on a continuous basis to enable them live and work meaningfully, to contribute to the development of their society. For technology education and training to contribute to an individual's personal development, increased productivity and income at work, it follows that technology institutions have to be well equipped to achieve the maximum benefit of Technical and Vocational Education and Training (TVET). If Nigeria is to meet up with the technologically advanced countries and be self-reliant, the content of the curriculum must cover the three basic educational objectives (domains of learning i.e. cognitive, affective and psychomotor). Provision of abundant training materials and quality teaching manpower will be meaningless without the knowledge of practical skill-oriented technical teaching methods. This paper therefore examines some fundamental strategies to be used in the organization of the learning content of technology education to include the cognitive, affective and psychomotor domains. The paper also highlights other practical methods such as experimental, tutorial and discovery. These will promote the ingenuity in the local technicians and indigenous skilled men and women which will further improve the acquisition of practical skills.

In this era of governments' transformation agenda, rapid technological advancement and emphasis on education for self-reliance, products of technology education requires cognitive and saleable kills to fit in the modern day industries. Such skills are also vital in terms of preparing students of technology education to be

competent job creators rather than job seekers upon graduation. Nuru (2002) stated that as economic, social and technological changes gather pace, people need to develop their knowledge and skills on a continuous basis through technology education so that they can live and work meaningfully in the knowledge society. The term 'cognitive' as a domain of the educational objectives refers to intellectual ability which connotes knowledge or thinking (Ezenwa, 1998).

Technology education is defined by the National Policy on Education (Federal Republic of Nigeria [FRN], 2004) as an aspect of the educational process involving in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding, and knowledge relating to occupations in various sectors of economic and social life. In general terms, technology education, vocational education, technical education, industrial technical education and industrial arts are used interchangeably. The slight variations in these terminologies being the degrees in which the educational attributes are acquired at any given level of the educational experience. Okorie (2000) defined skills as expertness, practical ability, dexterity and tact, an organized sequence of actions, competencies and proficiencies executed in carrying out a given task. Skills are displayed in flexible but systematic temporal pattern.

Education and training contribute to an individual's personal development, increased productivity and income at work, and facilitates everybody's participation in economic and social life. It follows that education and training can also help individuals to escape from poverty by providing skills and knowledge to raise output and generate income. But it is disheartening to note that over the years, the vision of vocational/ technical/technology education in Nigeria has been bastardized and eventually derailed resulting in the production of half baked skilled workers who are job seekers rather than employers of labour (Ogie-Aitsabokhai, 2006). Investing in education and training is therefore an investment in the future whereas knowledge and skills is the engine of economic growth and social development.

The Role of Technical and Vocational Education and Training (TVET) in Learning and Skill Development for National Growth

The effort to provide basic education and literacy for all children and adults will underpin the economic and social development of countries by ensuring the capacity of people to learn and provide the foundation for their employability and access to decent work. Technical and vocational education and training (TVET) at both secondary and tertiary education levels is mainly focused on producing readily employable skilled personnel for the labour market. This is why many people, both in the developing and developed world, recognize the important role that TVET plays in equipping individuals with relevant skills and hence enabling people to effectively participate in social,

economic and technological innovation processes. TVET also implies lifelong learning and preparation for responsible citizenship. It is imperative to note that TVET in its broadest definition includes technical education, vocational education, vocational training, on-the-job training or apprenticeship training, delivered in a formal and non-formal way (Netherlands Organization for International Cooperation in Higher Education [NICHE], 2010). A basic requirement for driving the engine of industrial and economic growth is a skilled workforce and TVET holds the key to building this type of entrepreneurial workforce (Afeti, 2009).

Quality TVET helps to develop the individual's knowledge of science and technology in a broad occupational area requiring technical and professional competencies and specific occupational skills. National TVET system needs to develop the knowledge and skills that will help the workforce become more flexible and responsive to the needs of local labour marketers, while competing in the global economy. Some countries like India, Korea and Japan have introduced TVET reforms that endeavour to integrate work-place-base learning and training into vocational education curriculum. TVET system must also be open and all inclusive to give even the most underprivileged access to learning and training. The opportunity for people in urban and rural communities to equip themselves to lead productive and satisfying lives will undoubtedly be critical to the prosperity and well-being of the community.

In a time of continuous economic, social and technological change, skills and knowledge become quickly out-of-date. People who have not been able to benefit from formal education and training must be given opportunities to acquire skills and knowledge that will give them a second chance in life and at work. Providing all individuals with learning opportunities throughout their lives is an ambitious but necessary undertaking. An all-inclusive lifelong learning system calls for mobilization on increased public and private resources for education and training and for providing individuals and enterprises with the incentives to invest in meeting their learning and skill development needs.

Unesco's Recommendations on TVET

The Revised Recommendation Concerning Technical and Vocational Education 2001 was adopted by United Nation's Educational, Scientific and Cultural Organization (UNESCO's) General Conference at its 31st organization's session in 2001. The conclusion concerning human resources training and development were adopted by the International Labour Conference at its 88th session in 2000. These texts present internationally acknowledged sound policies and practices on TVET and continuous, lifelong learning and training. The policy strategies are the outcome of extensive consultations between the organization's Member States, federations of professional associations, employers' and workers' organizations, and non-governmental

organizations, their statements have the ambition to guide national decision-makers to develop effective, relevant and equitable policies of education and training. They also seek to engage other stakeholders in TVET including the social partners, in partnerships that support these policies and practices. For instance, one of these recommendations stipulates that education policies should be directed to both the structural and the qualitative improvement of technical and vocational education. In addition, all governments carry the primary responsibility for technical and vocational education; and in a modern market economy technical and vocational education policy design and delivery should be achieved through a new partnership between government, employers, professional associations, industry, employees and their representatives, the local community and non-governmental organizations (NGOs). Furthermore, TVET should serve as the means by which people develop talents, interests, practical and entrepreneurial skills leading to an occupation in various sectors or to further education (UNESCO, 2001). As the titles of these statements suggest, UNESCO's concern in centred on technical and vocational education which the organization considers an integral part of the global education for all initiative.

The International Labour Organization (ILO) focuses on training for employment, decent work and welfare of workers in the context of global employment addenda. However, the two organizations are aware that education and training are rapidly becoming inseparable, especially as the notion of a job for life is being replaced by the necessity for lifelong learning. TVET is considered a very useful aspect of the education system because of the occupation content it offers the trainees. The emphasis is on acquisition of practical skills for direct-employment. But unfortunately, for years and until very recent times, Nigeria has not given the desired attention to TVET system to enable the sector contribute effectively towards national human resource development for a productive workforce. The issue of practical oriented education therefore should be given proper attention in technology education programmes.

The Need for Adequate Practical Content of Technology Education Programmes

The ideas planted concerning technical and vocational education are still much around the education sector. Though various governments since independence in 1960 tried to emphasize technical education for economic development of the nation, many of the country's tertiary institutions, colleges of technology and polytechnics still lack adequate practical content in their curriculum (Nkom, 1999). The Federal government has placed much importance on technology education to the well-being of the economy of the country and this is clearly manifested in the National Policy on Education (Federal Republic of Nigeria [FRN], 2004).

Two main aims in the policy's Article relating specifically to practical content of technology education are:

1. *providing the technical knowledge and vocational, technical practical skills necessary for agricultural, industrial, commercial and economic developments; and*

2. *to give training and impart the necessary skills leading to the production of craftsmen, technicians, technologists, and other skilled personnel who will be enterprising and self-reliant, respectively (pp. 30 – 31).*

This article is concerned with polytechnics, monotechnics, colleges of education (Technical); the universities of technology and their equivalence. These are the tertiary (post-secondary) institutions that truly offer technological programmes.

Technical education programmes are fundamentally practical skills oriented, and hence adequate provision should be made for the practical content of its curriculum and also allowance of improving same. According to Ezenwa (1998) vocational/technical/technology subjects best render themselves to the three domains of knowledge, viz: cognitive, affective and the psychomotor (psychoproductive). He went further to emphasize that the psychoproductive domain dominates the vocational/technical subject and that indeed according to McCloy (1999), seventy five percent (75%) of the technical/technology subjects are of a practical nature; which require technical skill, therefore it is necessary to sustain and improve the practical content of the technology fields of the study.

Having established the importance of practical content in technology education, there is the need to make sure that everything possible is done to ascertain that all the criteria to sustain and improve the practical content are effected, so that it can meet the objective of increasing employability of graduates.

Improvisation

The term improvisation has been defined differently by several scholars. Maduabum (1989) defined improvisation as the "act of raising alternative materials or equipment obtainable from local environment or designed and constructed by the teacher to facilitate instruction. According to Ango (1990), improvisation means substituting, replacing, altering a technical material or apparatus for a particular function. To Ada and Okwu (2001), improvisation simply means to provide, make or do something quickly in time of need using whatever is available.

From all the definitions that have been put forward, improvisation means making equipment and materials available in time of need. Therefore, where certain appropriate tools and materials are not available these can be improvised. This aspect can arouse the ingenuity in the local technicians and indigenous skilled men and women and further promote improvement on practical skills.

Delivery System

Perhaps the most potent way of enhancing and improving the practical content in technology/skill education is the appropriateness of the method of teaching workshop practice or the delivery system. Kennedy (2011) listed, "demonstration", "project method" among others as basic technology teaching methods requiring the use of tools and materials in the practical classes. Technical institutions teaching technology education must produce projects with attendant practical requirements.

However, a well-known set of student-centered technology teaching methods at the tertiary level is the family of workshop practice knows as "instruction sheets". Instruction sheets were originally developed and used in connection with vocational/technical classes under the title of "job sheets". The content of the sheets are organized for the purpose of analyzing and presenting instruction in jointed form to enable the learner proceed with less personal attention from the teacher. This methodology is very effective for productive purposes and for the production of functional job or items. There are seven types of instruction sheet-job sheet, project sheet, student plan sheet, operation sheet, assignment sheet, information sheet and programmed instruction sheet. Their names are descriptive. These instruction sheets help the students perform more practical work in the workshop on their own. Students cannot perform practical work without acquiring technical skills.

Organization of Subject Matter in the Teaching of Technology Subjects

This aspect of the delivery system for improving the practical content of technology education at the tertiary level is teacher/lecturer/instructor centred. It is a fundamental pre-requisite to the technology teaching methods enumerated under delivery system stated above. Okelola (1987) itemizes and sub-divides them into:

i. The unit method: subject matter unit, experience unit, and resource unit.
ii. Basic unit teaching plan: the unit plan, the project plan, the daily plan and the weekly plan.

Fundamental to all these strategies is the organization of the content for a given course, and the determination of the objectives of the course followed by booking down the objective into desired behaviour at each point. A 'Unit' is seen as major sub-division of a course or subject matter which is complete in itself and can be taught as a whole. The unit method of teaching technology subjects is the fundamental principle usually behind the construction of the syllabus of technology subjects using the behaviour pattern, indicating skills to be acquired and the overall practical content of the course or project. These could be planned in the timetable on a daily or weekly basis as listed in (ii) above. There is also the need to approach these methods through concise lesson plans and scheme of work.

The experience (competency-oriented) method in workshop practice entails the following:

i. Designing, sketching and drawing the project to be produced.
ii. Full list of hand and machine tools to be used
iii. Cutting list of material required.
iv. Sequence of operations, construction, and completion of the project

Other practical methods include the experimental, tutorial and discovery methods. Ezenwa's competency-based project-oriented method of workshop classes is a typical example of comprehensive practical skills organization system of teaching.

Linkage with Industry

No country is an island on its own says Bill Clinton former President of the United States of America, during a session marking the fiftieth anniversary of United Nations. In the same vein, no technological institution is infinitely fully equipped to acquire all the desired practical skills, without reaching out in Nigeria. The main linkage between technological institutions and the industries is through the Students Industrial Work Experience Scheme (SIWES), a supervised practical training period and an on-the-job scheme for various durations undertaken in relevant industries by students. It is funded by the industrial training fund (ITF) and supervised by the institution. The objective of SIWES is "to expose the students to work methods not taught in the institution and to provide access to projection equipment, materials and practical skills not normally available in the college environment". Indigenous to successful SIWES industries where supervisors are cooperative, students enjoy the opportunity of using advanced modern tools or materials to acquire new skills which are invariably transferred back to the college.

Conclusion

Technology education is the most capital intensive of all types of education. The resources to improve the practical content in the system, such as tools and raw materials, cannot be obtained without adequate funding. Adequate funds should be externally and internally generated. Both the public and private sectors of the economy must fund technology education adequately.

The need for tertiary institutions to improve on the practical content of technology education cannot be over emphasized. There is the need to produce basic and secondary needs, if Nigeria is to catch-up with the technologically advanced countries and be self reliant and, this cannot be achieved without practical skills. There is the need for appropriate workshop delivery system or technical teaching methods as the main strategies that would allow for adequate use of tools and qualified technical staff in a conducive workshop/laboratory atmosphere. Abundance of training materials

and qualified teaching manpower will be meaningless without the knowledge of practical, skill-oriented technical teaching methods.

However, there should be an improvement in practical content through appropriate delivery system at the tertiary level of the educational system, so that the practical content is not just only on paper, but actually taught in the institutions and it will enhance employability of technology graduates in Nigeria.

The era of holders of National Diploma (ND), Higher National Diploma (HND) or first or second degrees in technology without practical skills content or competence must stop. Functional technology education remains the fulcrum of economic advancement globally.

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