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Reappraising the Work Skill Requirements For Building Technology Education In Senior Secondary School For Optimum Performance In Nigeria

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Abstract
Effective handling of vocational technology education by all stakeholders paves way for sustainable development. Building construction which is one of the vocational electives in Senior Secondary School is poorly taught. It is regrettable to experience that a country crying for technological breakthroughs and emancipation cannot at this crucial time of technological age impart practical skills to the recipients of her technology education. Building construction which is an integral part of vocational technology is worst hit in this imbroglio. It is observed that the teaching of building construction is too theoretical to the detriment of the psychomotor aspect of the programme. The difficulties in imparting the practical skills in this subject is caused by the teachers not possessing adequate skills in the subject, inadequacy of teaching materials and facilities, curriculum invalidity in terms of teachability and learnability, poor teaching strategies to mention but a few. This paper, therefore, reappraises the state of affairs in the teaching of building construction and advances some strategies on how the subject can move forward.

1. Introduction

The importance of building technology which is an integral part of technical and vocational education cannot be over emphasized; since this field of study represents core indices of national development. A major distinction between an advanced country and a developing one is to a large measure the difference between their levels of scientific and technological development in various areas of technology education, building technology inclusive. Thus, it is no exaggeration to assert that technology education is also the bedrock upon which advance nations are based (Egboh, 2009).

Lack of technological capacity has made developing (Third World) nations to be relatively poor. Developing nations are poor because of their negligible investment in science

and technological know-how and their people do not have the capacity to inform themselves in a competitive knowledge driven world. Increased competition in a global market place, adds to the need and urgency to get the right people, with the right skills, in the right place, at the right time (Odu, 2007).

The Senior Secondary School constitutes the beginning of what may be described as the finished product of a lower level of skill and aptitude. The level is expected to raise a generation of students who can think for themselves, respect the views and feelings of others, respect the dignity of labour, and live as good citizens. The curriculum in technology education has been well articulated with functionality and the integration of theory and practical/workshops as paramount aims. Creativity and improvisation are also highly rated.

2. Vocational Technical Education/Pre-Professional Education in Secondary Schools

At Senior Secondary Schools, technical colleges and vocational centers, vocational technology education is meant for either pre-professional training or for production of low-level manpower (skilled labour) i.e. artisans, craftsmen and master craftsmen for the labour market. Vocational technical education in this level requires relatively low-cognitive and psychomotor abilities for mastery. Its curriculum is usually framed on the basis of 70% manual and 30% cognitive skills. It is education for doing rather than for knowing things.

Vocational technical subjects taught in Senior Secondary Schools are Building Construction, Woodwork, Metal work, Applied Electricity, Auto-Mechanics, Electronics, Technical Drawing, Agriculture, Book-keeping and Accounting, Commerce, Computer Education, Clothing and Textiles, food and Nutrition, Home Management, Shorthand, Typewriting, Fine Art and Music (FRN, 2004).

There is a great need for technological orientation of the Senior Secondary School students in Nigeria. In order to improve the pace of the nation's technological development, these students should be made to acquire relevant knowledge, skills and desirable work habits. They need to understand and manipulate processes and materials. Consequently, a curriculum is needed to facilitate the acquisition of such skills and knowledge in Building Construction so that they may gain employment in related industries, be self-employed or pursue higher technological education.

The Federal Ministry of Education, Science and Technology (1985) state the goals of the curriculum of the Senior Secondary School in Building Construction as follows: the Senior Secondary School students will achieve the following objectives:

- understand the processes, materials, tools and equipment used in building construction;
- construct or supervise the construction of a simple residential building;
- prepare for further studies in the construction or allied professions;
- earn a living through participation in building construction work;
- Inculcate safe working habits in building construction.

The curriculum content has been carefully structured. Using the conceptual approach the two major concepts being construction and workmanship. The organization of selected topics and contents into a teaching sequence has been achieved through the spiral approach. The course which covers the major operations and materials involved in the construction of buildings is organized around the sections of preliminaries, sub-structures, super-structures, services, finishes and external works.

In order to achieve the objectives of this course, it is suggested that a teaching strategy that involves observation, field trips and active participation of learners in the construction of

simple building works should be used. Since the course is intended to be practically oriented, less theory should be taught. Simple explanations, sketches and descriptions should form the basis of the cognitive activities of this course. Because of the high incidence of accidents common in building construction, it is important hat when discussing each topic, the relevant safety requirements be emphasized. It is also recommended that a minimum of four periods of forty minutes each per week be provided for this course on the school time-table.

Evaluation is regarded as an important aspect of this curriculum plan. Therefore, periodic written tests and assessment of practical works should be embarked upon. This may be done at the end of every topic so as to ensure some form of consolidation before the next topic is taught. According to the Federal Ministry of Education, Science and Technology (1985), the content of the curriculum of Senior Secondary School in building construction is broken down into year one, two and three.

Topics in year one include:

A. Preliminaries
- Construction team
- Building drawings
- Site organisation and layout
- Clearing, leveling and setting out

B. Sub-structure
- Excavation
- Foundation
- Ground floor

C. Super-structure
- Walls
- Manufacture of wall materials

D. Services
- Drainage
- Plumbing
- Electrical installation

Topics in year two include:

A. Sub-structure
- Excavation
- Foundation
- Ground floor

B. Super-structure
- Openings in walls
- Roof

C. Services
- Drainage installation
- Plumbing
- Electrical installation

Topics in year three include:

A Super-structure
- Roofs

- Ceilings

B. Services
- Drainage installation
- Plumbing

C Finishes
- Wall finishes
- Floor finishes

D. External works
- Fences and Fencing
- Gates
- Access roads
- Landscaping work

3. Teaching of Building Technology Education

Education is the acquisition of needed competencies for life in the society. For a balanced education, such competencies should spread through the cognitive, affective and psychomotor domains. According to Igborgbor (2006), cognitive competencies include:

- Knowledge of certain facts either directly or indirectly usable in particular situation.
- Deeper understanding of phenomena in one's environment
- Enhanced reasoning ability which leads to a better understanding of situations.
- Creativity and motivation

Therefore, balanced education can be classified into the following domains

COGNITIVE DOMAIN	AFFECTIVE DOMAIN	PSYCHOMOTOR DOMAIN
Knowledge	Receiving	Imitation
Comprehension	Responding	Manipulation
Application	Valuing	Precision
Analysis	Organization	Actualization
Synthesis	Characterization	Naturalization
Evaluation		

Teaching methods refer to the ways and means which a teacher adopts to guide the students through learning activities in order to accomplish the desired goals. Effective teaching takes place when the teacher knows which method to use in a particular situation to meet specific goals. The following are methods of teaching of vocational technology education, building technology education inclusive:

- Demonstration
- Discussion
- Project
- Guilded discovery
- Inquiry
- Lecture
- Questioning
- Simulation
- Field trips

- Individualized instruction

Each teaching method has its own pros and cons.

4. Current Situation in the Teaching and Learning of Building Technology Education in Nigerian Secondary Schools

The teaching and learning strategies as adopted in the National Policy on Education (FRN, 2004) ensure the integration of theory with practice. There are differences between policies, strategies and implementation. Amike (1988) observed that the well articulated curriculum content of building technology in secondary schools have not enjoyed the same level of confidence in implementation as in the curriculum designed.

Despite the gains in curriculum development and efforts at implementation, reports indicate poor students' achievements especially in the practical aspects of the course. In addition, there is low enrolment in this field of study in the secondary schools. It is discovered (Odu, 2005) that only few secondary schools in Nigeria offer building technology in secondary schools. Similarly, parents/guardians are reluctant to allow their children/wards to take the subject.

The difficulties in curriculum implementation in this course are attributable to the following:

- Overloading of content
- Inadequacy in pedagogically associated issues such as teacher competence and effectiveness
- Inadequacy of teaching materials such as equipment, tools and workshops
- Curriculum invalidity in terms of teachability and learnability, particularly with respect to the cognitive level of students (Ivowi, 2000).

It is the opinion of the author that building technology in secondary schools should be reappraised for optimum performance in work skill.

5. Challenges of Teaching Building Technology in Secondary Schools

The emerging world economy of the 21st century is not only knowledge based and science and technology driven, it is highly competitive and globalized. The human brain is now the number one resource and is re-affirming the fact that learning is a life-long process. Thus, skills certification is more relevant and critical to our nation's sustainable development and global competitiveness. The quality of teaching and learning of building technology in secondary schools leave much to be desired.

Some of the challenges facing the teaching inhibit the full realization of the quality education outcome include:

6. Poor Teaching Strategies

The teaching of building technology has been too theoretical. There is no longer much emphasis on the learners' practical skill acquisition. Teachers in most cases use lecture method only in a programme that demands lecture method and demonstration. Odu (2006) maintained that appropriate teaching strategies should be employed in teaching technical education subjects of which building technology is a part so as to achieve the national goals as elucidated in the National Policy of Education.

7. Dearth in Qualified Vocational Technical Teachers in Building Technology Education

There is inadequacy of qualified vocational technical teachers in building technology education that can actually impart the practical skills on the students. In 1997, a survey report by the Nigerian Educational Research and Development Council (NERDC) revealed the state of demand and supply of technical and vocational teachers nation wide and discovered that seventy four percent of the TVE teachers (about 270,000) were not available for 23 different subjects including building construction (Yakubu, 2001). Gang (1989) asserted that technical and vocational education in the secondary school has not been properly implemented because of dearth in TVE teachers.

The acquisition of building construction skills in secondary schools depends more on the teachers. Building construction teachers should be professionally qualified and occupationally competent so as to impart the required skills to the students. It is unfortunate that some building construction teachers are not knowledgeable and skilled, and the wrong methods of teaching adopted do not promote skill acquisition since no student can claim to possess more knowledge and skill more than the teacher in any subject.

Alhassan (1990) in Anaele (2002) stated that the amount of knowledge and skill imparted to the students should meet the demand of industries and that the academic environment in technical colleges/secondary schools ought to be a replica of what is found in industries. This can be only achieved if the teachers are qualified, workshops/laboratories fully equipped for according to Ukwunna (1985) in Anaele (2002) no meaningful learning occurs in a void.

8. Inadequate Facilities

Facilities like classrooms, workshops, laboratories, studios, equipment and materials are grossly inadequate in our secondary schools. The difficulty in the procurement of facilities does not give room for the practical acquisition of building technology skills by learners. Similarly, the reason why the facilities are not there is partly due to high cost of vocational and technology education and also high inflation rate in Nigeria (Imarhiagbe, 1992). The impact of inadequate educational facilities is that training of the students becomes impeded and they end up not acquiring skills to go to the labour market.

9. Administrators' misconception of the Nature of Vocational Technical Education

One of the greatest problems facing vocational and technology education in secondary schools is that many administrators of the programmes, at the policy making level are not trained in vocational technology education. They do not seem to understand the needs of the programme when it comes to distribution of funds, hence vocational and technology education is grossly underfunded and so skill acquisition in schools especially in the area of building technology is difficult to implement. The underfunding affects the supply of modern facilities and equipment needed to train building technology education students of the 21st century. Furthermore, there are few trained vocational and technology education teachers in all the fields of study dedicated to the programme.

Egboh (2009) stated the following challenges confronting vocational technology education which building technology is a part:

- Limited industrial experiences and opportunities for practical on course experience
- Inadequate guidance and counsellors to science, vocational and technology education subjects
- Shortage of books and materials including outdated literature
- Inadequate administration
- Inadequate evaluation of education outcome through continuous assessment

- Inability of teachers to make the subjects more attractive to students and more relevant to societal needs
- Poorly planned expansion and enrolment
- Inadequate policy and instability of education systems
- Absence of acceptable value and ethical systems.
- Inadequate political commitment to quality education

10. Strategies in Improving the Teaching and Learning of Building construction in Secondary Schools for Reappraising the Work Skill Requirements

10.1 Improvement on Teaching Strategies

Teaching methods used for teaching building construction leaves much to be desired. Arubayi, Nworgu, Akpochafo and Odu (2008) suggested the following teaching strategies in vocational and technology education that will enhance skill acquisition among teachers and learners in Nigerian secondary schools:

a. Concept Formation
b. Real Life Application
c. Job-related Skills acquired by the learners
d. Demonstration
e. Equipment, Care and maintenance
f. Diagrams/Illustrations/Drawings

Sub-scales are further defined below:

- Concept Formation: This deals with all the ideas coming from the teacher and learners culminating in the formation of what the topic/object of discussion is.
- Real Life Application: This evaluates the ability of the teacher to make the learner relate what is learnt to everyday activities in the environment and beyond. Real life application makes reference to the implication of the concept to real life/possible future careers.
- Job Related Skills Acquired by the Learners: The topic of subject matter should offer various skills to learners which they can use in the world of work.
- Demonstration: This sub-scale explains all the teacher does in the class/laboratory/workshops or studio to engage the attention of the learners to him/her in order to replicate the procedure and process involved in an experiment/workshop practice, etc.
- Diagrams/Illustrations/Drawings: These sub-scales emphasize teacher's use of drawing/diagrams as it relates to the topic and stressing the importance of accuracy in spelling, labeling and neatness of diagrams.

10.2 Adequate supply of Vocational and Technology Education Teachers in Building Construction by the Government

Vocational and Technology Education teachers specifically in building construction in secondary schools need to be trained and retrained in large numbers preferably through scholarship by government. To retrain them in the education industry, they should be highly remunerated by the government. Teaching allowances of between 35 and 40 percent of teachers' monthly salary should be paid to them in order to stem their exodus to the

industries. This little encouragement will make many more technology education teachers including building construction teachers to stay o the job (Farrugia, 1985).

10.3 Acquisition of Requisite Skills by Both Teachers and Students for Economic Production in Vocational and Technology Education

For vocational and technology education curriculum to be useful, in the secondary schools, the right caliber of teachers should be used to implement the programmes especially in building construction. The benefits of a quality education programme are based on inculcating the skills for self-reliance. Agbai (1989) opined that the alarming rate of unemployment has forced the government to stress on self-employment and self-reliance as alternative to paid employment.

Skill acquisition for youth development in various areas of vocational and technology education including building construction is so important that National Economic Empowerment Development Strategies (NEEDS) (2004) makes it one of intervention strategies targeted at youth development and to reduce urban poverty. NEEDS also believes that poverty can be reduced, wealth can be created and quality of life improved when people care trained to acquire skill relevant for the world of work.

The rate at which skill is acquired is a function of knowledge of result i.e. feedback (Holding, 1965).

10.4 Attitudinal Change Towards Vocational and Technology Education

Enlightenment campaign should be mounted in the mass media, radio, television, internets etc on the importance of vocational and technology education including building construction in the secondary schools. This campaign will improve Nigerian technological culture and national development. Vocational and Technology education should have separate planning, separate administrative and operating arrangement from general education (Okorie, 2001). There should be a changed attitude towards vocational and technology education by all stakeholders.

10.5 The Use of Workshop Practical Project

In the early experiences of children they learn both to do and to know better by doing things. Through practice learners, experience in the case of psychomotor activities becomes more skilled. At the same time, their knowledge grows and they also develop certain attitudes. Odu and Biose (2003) stressed that project is used to identify a wide variety of students' learning experiences which emphasizes the application of skills and knowledge that result in some type of product.

A project may be ceramic, moulding e.g. flower vase, simple construction of wood joints, casting of concrete foundation, laying of blocks/bricks, floor tiling, etc. With the above statement, the major purpose of using project is to provide an opportunity for practical application in a context that is meaningful to students. Ezeji and Okorie (1988) defined project as a whole hearted, purposeful activity planned and carried to completion by the students.

Practical project of students in building construction might be construction of a room measuring 3.0m by 3.0m. This task may include the building plan, setting out of the building, digging the trench, casting the foundation, setting out the first course of blocks on the foundation, laying other blocks up to D.P.C. level, marking out of doors, laying other courses of blocks up to window level, marking out the window, laying other courses of blocks up to lintel level, erecting formwork for lintel, placement of reinforcement bars in the formwork, casting the concrete in the lintel, laying the other course of blocks up to gable end.

Project method in learning help to motivate the students or the learners of technical facts and related knowledge in all spheres of learning and so it is highly recommended for students offering building construction in secondary schools.

10.6 The Use of Field Trips

Fieldtrip could be a visit to dealers or manufacturers of technical equipments and materials, industries etc, so that students would be provided with information about processes of materials, their properties, use and costs. Ezeji (1987) emphasized that vocational skills acquired through classroom instruction must have industrial application. This means that school training programme must be geared towards understanding of industrial practices and production methods.

From this statement, it indicates that students can learn skills on building technology by carefully watching their teachers or others do something they want to do, since watching others perform helps to eliminate some of the trials and errors that would have been made. The methods used in classroom and workshop instruction supplement outside study and on the job training, hence, environmental approach (using the environment for practical activities) is the answer so that building technology education teachers can organize their teaching towards methods that will facilitate teaching and learning processes. This, then means that for a teacher to be able to identify relevant activities in the environment to be used by students for practical experience, he must select skills, method, procedure and processes that are similar to those used in real life situation but different in size and complexity,

Other strategies in moving the teaching of vocational technology education forward in building construction according to Egboh (2009) are:

- Re-designing of school curriculum using the thematic approach to content selection and retaining a spiral approach to content organization
- Greater community involvement in the management of schools especially Parents, Teachers Association
- Teachers should devise means to further make the subjects more relevant to societal needs and promote the entrepreneurial opportunities of skilled persons.
- Improving the standard of facilities through the provision of modern laboratories, workshops, equipment, etc.

11. Conclusion

Building construction is one of the vocational electives in the Senior Secondary School. It involves skill acquisition in building drawing, site organisation and layout, clearing, leveling and setting out, excavation, foundations, walls, roofs, ceilings, services, drainage, finishes, external works, etc. The teaching of these topics in the secondary school leaves much to be desired as the practical aspect of this programme is either partially or totally untouched. The reasons are due to poor teaching strategies, dearth in qualified building technology education teachers, inadequate facilities to mention but a few. Nonetheless, with the strategies suggested and implemented, the teaching and learning of building construction in secondary schools will be moved forward.

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