THE ROLE OF ICT IN THE TEACHING OF METALWORK TECHNOLOGY

Basheer Garba Fagge

Abstract
At the beginning of this millennium activities globally faced new challenges including teaching particularly with globalization of the world as one village in terms of information and communication technology. The modern technology has narrowed the world to the point that people interaction has become too close with virtually no barrier. To this angle education is not excluded. The paper views the role of ICT and the teaching of technical education in general and metalwork as a profession an forward possible ways to enhance its teaching through the effective usage of modern ICT techniques.

Introduction
Human beings by their nature are not static in the sense they change due to physical growth, mental development, social interaction and environmental development and changes. These phenomena make human beings to be naturally dynamic. It is believed that education is the only tool that makes effective changes in human life and the changes are for better.

The dynamism of education caused it to constantly undergo reviews and changes triggered by societal demands and general needs. To this angle education is use as instrument per excellence for solving socio-economic problems of unemployment, hunger, poverty, Adewumi (2009). This assertion makes education to be dynamic in nature and must be under review from time to time. Planners are always making it standard both in teaching and learning, incorporate new materials in terms of curriculum content to be in conformity with global changes.

Teaching and learning are the two principles components of what education is all about. Both of them can not be effective if required tools to enhance them are not available. These tools are materials needed in order to simply the teaching and learning of the curriculum.

In a classroom situation or any environment for the purpose of instruction, three elements are involved. These elements are:
1. The source
2. The medium
3. The receiver

These three elements must always be functional if at all teaching and learning should take place.

What is Information and Communication Technology (ICT)?
Information and Communication Technology is the processing and distribution of data using computer hardware and software, telecommunications, and digital electronics.

But in technical term ICT means the use of electronic gadgets for the transmission of information. Scholars have given definitions with regard to ICT in relation to its uses. Akindolu (2005) in Robert (2009) sees ICT as all kind of electronics that are used for broadcasting, telecommunication and all forms of computer-mediated communication. Eze (2002) in Robert (2009) went further to include the acquisition, processing, storage, and dissemination of vocal, pictorial, textual and numerical information by micro-electronic. This is showing the scope or the extend ICT
has gone or covered in human life. Virtually one will believed that ICT is a technological advancement in the creating, storing, retrieving, and dissemination of information with reference to olden days system of record keeping.

ICT components refer to the electronic gadgets that one manipulates for the purpose of solving one problem or the other. In this regard it is worth mentioning that while man progress through communication much earlier, the new technology in communication has lift him more advance and effective. There is no single area of human endeavour that new technology in communication has left untouched.

**Education and ICT**

For the purpose of this gathering my paper will restrict discussion to education and narrowed down to teaching of technical education general and to metalwork in particular.

Almost all aspect of education ICT has covered. This include on-line studies, on-line application for admission, on-line registration, on-line viewing of result e.t.c.

But when one refers to teaching and learning it will be seen that ICT has enhanced or improved these two components of education. While teachers have improved their teaching strategies on one hand, the learners have also enhanced their learning abilities through searching for information via the internet. These two have gain positive changes because the medium has great improvement in terms of effectiveness.

**What is Technical Education?**

At any forum of this nature terms like technical education are continuously being defined by scholars. In order to refresh our minds few of these definitions are given here. Olaitan (1996) in Rano (2009) sees technical education as education designed to developed skills, abilities, understanding, attitudes, work habits, appreciation encompassing knowledge and information needed by workers to enter and make progress in employment in a useful and productive basis.

Also United Nation Educational, Scientific and Cultural Organization (UNESCO, 2007) sees technical education with vocational as a comprehensive term referring to those aspect of the educational process involving, in addition to general education, the acquisition of practical skills, attitude and understanding and knowledge relating to occupations in various sector of economic and social life.

The definitions above are not contrary in context and meaning from the definition given by the national policy on education 4th edition of 2004 which says that technical and vocational education is the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sector of economic and social life. Along this line Federal Government of Nigeria (2004) in Fagge (2009) gave the objectives of technical and vocational education as

a. A means of preparing for occupation fields and for effective participation in the world of work,

b. An instrument for promoting environmentally sound sustainable development,

c. A method of alleviating poverty

By these and other objectives, the technical education focused at meeting the followings among other goals.
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- Provide trained manpower in applied science, technology and business particularly at craft, advanced craft and technical levels.
- Give training and impart the necessary skill to the individual who shall be self-reliant economically (FGN, 2004).
  It is important to mention areas that referred as technical fields, courses or trades. Technical education comprises the following five major areas. These are:
  - Automobile technology
  - Building technology
  - Electrical/electronics technology
  - Metalwork technology
  - Woodwork technology

As mentioned above in a nutshell the main objective is to produce skilled manpower that can successfully participate in the labour market of to at least be self-reliant (FGN, 2004).

Any of these area is characterized by both theory and practical activities and successful learning of the curriculum content can only be achieve if the practical which carries more weight are conducted and accomplished. At this point the emphasis is on the learning of the new technology of conducting these practical. The new techniques that are guided by computer, known as Computer-aided technology or numerically control system. The ideas here will both assist the teacher in imparting the updated knowledge on one hand, and the needed information by the students will be obtained. This is because it is highly important as technical teachers to disseminate knowledge that is currently in use especially in terms of manufacturing processes.

The Role of ICT in Teaching of Technical Education

The national policy on education of 2004 has spelt out subjects or trades to be taught at both junior level and senior or technical colleges. Also the NCCE minimum standard has given the courses and their credit units. The documents have specified nature of teaching and learning materials needed and type of environment ideal for successful outcome.

Engineering or technological development in advanced counties is far ahead of our level and standard. This is because they see science and technology as tools for development and have already took the advantage of ICT into their educational system and became part and parcel of it. There is no aspect or field of study that ICT is not showing positive impact on both teachers and students. Among all areas of learning science, engineering and technology are dominants in the application of new technology of ICT.

In a typical classroom situation computer have replaced most teaching method where software programmes are develop to ease learning for both theory and practical components. With the nature of technical education which comprises about 70% practical and 30% theory in an ideal situation, computer-aided instruction is being use in most advanced countries. Learning and instruction materials especially in practical class are carried out with assistance of developed software programme and installed on machine tools. This programme is called numerical control system.

The Role of ICT in the Teaching of Metalwork Technology

Metalwork technology is of the areas of technical education, and it comprises theory and practical. By the nature of this course there is no part of it that does not involve practical. The practical aspect is made up of two parts. These are

1. Fitting or bench work
2. Machine work
There is less involvement of computer-aided instructional work in the fitting or bench work, but the machine is the aspect that computer has completely taken over most instruction techniques in schools and manufacturing work. This is so in advanced countries.

In a typical metalwork classroom especially practical class, the following machine tools are found. These include:

- Lathe machine
- Milling machine
- Shaper or shaping machine
- Drilling machine
- Surface grinder

The above mentioned machine tools and others are now operating via this technology i.e. numerical control system. This is a system whereby machines have attached computer through which operations are programmed and coordinated by reading or interpreting mechanism. The programme control and manipulate the machine tool table and cutting tool.

Krar, Oswald and Amand (1976) defined numerical control system as “a method of accurately controlling the movement of machine tools by a series of programmed numerical data which activates the motors of the machine tools”

This new technology in machine operation is the main reason here that both teachers and students of metalwork technology need to have knowledge in computer science. This will make everyone to adapt to this new changes in production or manufacturing processes. It should be known that two basic computer programmes are in use for the purpose of teaching and learning which are essential and will help greatly and effectively in the teaching of technical courses in general and metalwork technology in particular.

These are:

1. **Computer-Aided Instruction (CAI):** This is a software programme that guides a user on how to carry out intended work or project. Ralph (2008) explained the role of Computer-Aided Instruction (CAI), as diverse and rapidly expanding spectrum of computer technologies that assist the teaching and learning process. Examples of CAI applications include guided drill and practice exercises, computer visualization of complex objects, and computer-facilitated communication between students and teachers (Raph, 2008).

2. **Computer-Aided Design (CAD):** The application of computers in the design and manufacture of components used in the production of items such as automobiles and jet engines. Computer-Aided Design (CAD) is a software for creating precise engineering drawings. Computer-Aided manufacturing (CAM) is another software attach to a machine tool, such as drill or a lather. CAM engineers similarly use computer modeling to determine the best overall manufacturing procedures for use in an industrial plant, including the test and handling of finished products. Engineers use CAD and CAM together to create the design in CAD on one computer, and then transmit the design to a second computer that creates the part using CAM. (Ralph, 2008).

In the history of computer design and manufacturing, Ralph (2008) explained that the earliest CAM software was a simple computer attached to a milling machine. Punching buttons on the computer’s front panel programmed the software for the machine. Since the mid-1980s CAD and CAM have come close together, as some CAM software operates within the CAD software programs instead of through shared database.
Therefore these two main tasks cannot be carried out successfully without the knowledge in computer which the backbone of ICT. It is highly important that students pursuing technical and technology courses must learn certain aspect of computer application. This point has its basis from the current technical college curriculum in operation whereby students offer ICT as subject. This is an indication to the importance of computer science education for technology courses.

**Conclusion**

It is believe in our world of today things have changed due to technological advancement especially in engineering production or manufacturing processes. Therefore, we have not way out rather than to accept the challenges and address it squarely by adopting strategies that will give us the required technology in order to go with global trend.

**Recommendations**

The challenges of technological ambitions can be address if the following recommendations can put into practice.

1. Computer science should be part of all technical programmes for NCE students
2. All courses that involve use of machines tools, software programming of CAD and CAI should be incorporated
3. Government should put plans for replacing the present obsolete machine in our institutions with modern ones.
4. Reading materials in our libraries need to be replacing with current text.
5. There is no too much in funding education, government to fund education as recommended by UNESCO.

**References**


