

Innovative Methods of Teaching Basic Technology in Junior Secondary School through Multimedia Instructions in Nigeria

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Abstract

This study reviewed the availability and relevance of Multimedia Instructions in schools to improve skills and competence of junior secondary school students (public and private schools) in Basic technology and influence of the application of Multimedia instructional materials and its innovations in teaching and learning of the subject. The paper therefore discussed in details the concept and objective of basic technology and the traditional method of teaching. The paper also highlighted some limitations of traditional method and went further to discuss innovative improvement brought by multimedia and use of multimedia instructional materials in teaching of basic technology in Nigeria's junior secondary schools. It was recommended among others that both parents and government to collaboratively provided all necessary electronics teaching equipment to Junior Secondary Schools.

Keywords: Basic Technology, Tradition Teaching Method and Multimedia Instructions.

Introduction

The role of technology in teaching and learning is rapidly becoming one of the most important and widely discussed issues in contemporary education policy (Rosen and Well, 1995; and Thierer, 2000). Most experts in the field of education agreed that, when properly used, information and communication technology hold great promise to improve teaching and learning in addition to shaping workforce opportunities. Poole (1996) has indicated that computer illiteracy is now regarded as the new illiteracy. This has actually gingered a new and strong desire to equip schools with computer facilities and qualified personal necessary to produce technologically proficient and efficient students in developed countries of the world. There is no doubt that computer can aid the instructional process and facilitate students' learning. Many studies have found positive effect associated with technology aided instruction (Burnett, 1994, and Fitzgerald and Warner, 1996).

Okebukola (1997) concluded that computer is not part of classroom technology in over 90% of public schools in Nigeria. Thus the chalkboard and textbooks continue to dominate classroom activities in most secondary schools in Nigeria. If a country such as Uganda which has less than a-fifth of Nigeria's resources, is now using multimedia technology to help secondary schools students to become better information users, why is Nigeria lagging behind? The answer is simply mismanagement of the huge resources of the country and inability of political leaders to prioritize Nigeria's developmental needs. There is no doubt that in the current harsh economic competition, the private sector in Nigeria such as banking sector, insurance, manufacturing industries and multinational companies in the oil sector have embraced multimedia technology to bring innovative solutions to their current challenges.

In educational multimedia application Shavinina (1997) asserted that today's learning contents are domain-specific products and that they dominate the world market. According to Shavinina (1997), domain-specific educational multimedia is directed to knowledge acquisition skills development in the language arts, history, physics, literature, biology and so on.

Basic Technology

The subject guidelines and contents have been carefully structured into a teaching sequence, which consists of clear explanations and descriptions of how results are obtained by using different tools, machines and materials. Basic technology is also a skill development course, which aims at providing students with technical literacy for everyday life. According to Nigeria's Federal core curriculum, the objectives of basic technology are to:

- (i) provide pre-vocational orientation for further training in technology;
- (ii) provide basic technological literacy for everyday living; and
- (iii) stimulate creativity.

Basic technology at this level is also meant to provide basic knowledge about industrial technology. It is designed to develop in students an appreciation of technology and an interest in specific areas of industrial technology. On completion of junior secondary school, according to FGN (2004), students are streamed into: (i) senior secondary school; (ii) technical college; (iii) an out-of-school vocational training center; and (iv) an apprenticeship scheme. This is based on results from the Junior Secondary School Certificate Examination (JSSCE), whose purpose is to determine their academic ability, aptitude and vocational interests. The curriculum used to teach the subject of 'Basic Technology' was developed by various subject specialists. For instance, those who studied electrical and electronics were asked to write chapters or textbooks related to the subject, those who studied architecture and building focused on related subjects, and those who studied engineering were asked to contribute to engineering related subjects. Most are controlled by Nigerian Educational Research and Development Council (NERDC). The review of the textbook is usually carried out after five years.

The textbooks used in teaching basic technology in schools are an important source of course content. A textbook can be used to define the boundaries of content, the order in which specific topics are taught and, most importantly, how they are presented. In technology classes, a textbook can be a source for problems solving, explanations, and a means of connecting the students with the emerging technologies. For several reasons, it seems that textbooks significantly influence the content and emphasis of courses teaching about technology in classes for elementary teachers.

Basic technology textbooks are prepared by those who have expertise in particular subjects since they cover different technological areas related to, for example, the automobile, building, metalwork, woodwork, ceramics, rubber, plastics, electrical and technical drawing. These textbooks are prepared in line with the curriculum content guidelines prepared by the Nigeria Educational Research Development Council (NERDC), which are recommended by the Federal Ministry of Education and various state ministries of education. Among the goals of secondary education according to the National Policy on Education (FRN, 2004) are to:

- (i) provide all primary school leavers with the opportunity for education of a higher level,
- (ii) provide trained manpower in the applied science, technology and commerce at sub-professional grades,
- (iii) Provide technical knowledge and vocational skills necessary for agricultural, industrial, commercial and economic development.

These goals are still valid today. To achieve the goals, the junior secondary education is both pre-vocational and academic, and is meant to be tuition free, universal and compulsory; however, many students apply to technical schools today when they cannot gain admission to non-technical higher institutions. In fact, they have to pay higher schools fees in all higher institutions and the education is not compulsory at that level. It was meant to teach basic subjects such as basic science, mathematics, and English language, which enable students to acquire further knowledge and skills. All students in junior secondary school are expected to take a minimum of ten and maximum of thirteen subjects. Basic technology is one of the core and compulsory subjects offered at junior secondary school level. In the junior secondary curriculum basic technology includes a broad range of fields of study and subjects such as auto mechanics, applied electricity, building, ceramics, metalwork, woodwork, plastics, rubber, food preservation, storage, technical drawing and other miscellaneous topics. The basic technology course is meant to provide a holistic view of technology to students.

Traditional Teaching Method

In the pre-technology education context, the teacher is the sender or the source, the educational material is the information or message, and the student is the receiver of the information. In terms of the delivery medium, the educator can deliver the message via the "chalk-and-talk" method and overhead projector (OHP) transparencies. This directed instruction model has its foundations embedded in the behavioral learning perspective (Skinner, 1938) and it is a popular technique, which has been used for decades as an educational strategy in all institutions of learning. Basically, the teacher controls the instructional process,

the content is delivered to the entire class and the teacher tends to emphasize factual knowledge. In other words, the teacher delivers the lecture content and the students listen to the lecture. Thus, the learning mode tends to be passive and the learners play little part in their learning process (Orlich et al., 1998). It has been found in most institutions by many teachers and students that the conventional lecture approach in classroom is of limited effectiveness in both teaching and learning. In such a lecture students' assume purely passive role and their concentration fades off after 15-20 minutes.

According to Abdul-Wahab and Afeti (2009), there is a dearth of textbooks in all developing countries. Students rely mostly on simple handouts or verbal lectures. Many teachers have access to inadequate or outdated resources. Poorly trained teachers are in a weak position to produce the teaching material they are expected to deliver. Imported textbooks are too expensive and not suitable for the curricula. Local capacity for textbook writing is not mobilized. Only a few countries have dedicated technical teacher training institutions (Ivory Coast, Namibia, Ghana, Nigeria, and Burkina Faso).

Some limitations which may prevail in traditional teaching method are

- Teaching in classroom using chalk and talk is "one way flow" of information.
- Teachers often continuously talk for an hour without knowing students response and feedback.
- The material presented is only based on lecturer notes and textbooks.
- Teaching and learning are concentrated on "plug and play" method rather than practical aspects.
- The handwriting of the lecturer decides the fate of the subject.
- There is insufficient interaction with students in classroom.
- More emphasis has been given on theory without any practical and real life time situations.
- Learning from memorization but not understanding.
- Marks rather than result oriented.

Multimedia Instruction-learning processes

Multimedia, is the combination of various digital media types such as text, images, audio and video, into an integrated multi-sensory interactive application or presentation to convey information to an audience. Traditional educational approaches have resulted in a mismatch between what is taught to the students' and what the industry needs. As such, many institutions are moving towards problem-based learning as a solution to producing graduates who are creative; think critically and analytically, to solve problems. In this paper, we focus on using multimedia technology as an innovative teaching and learning strategy in a problem-based learning environment by giving the students a multimedia project to train them in this skill set.

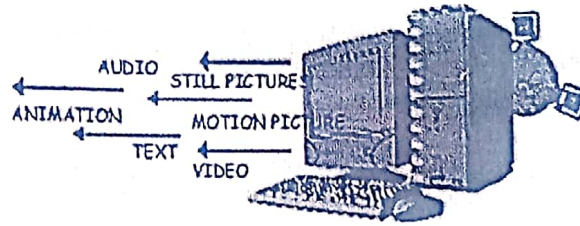
Video-based Tutorial Learning

With the popularity of computer-based instruction, video-based tutorials as a means to learn various software programs have become commonplace as is evidenced with a quick YouTube search of most major software programs. The perceived advantage of this instruction method is that students are able to watch, review, and utilize lesson recordings in whatever manner best suits their educational needs. Some studies have reported positive findings in relation to video-based tutorials, reporting a greater ability for students to construct, or discover, their own knowledge (Bork, 2000) or that foreign students with weaker language skills prefer Web-based tutorials to traditional class lectures (Sweeney & Ingram, 2001). However, Merino and Abel (2003), reported findings, which are consistent with other studies, that there was no statistical significant difference in student learning when comparing video tutorials and traditional lectures.

Innovations Brought by Multimedia

Currently, many institutions are moving towards problem-based learning as a solution to producing graduates who are creative and can think critically, analytically, and solve problems. Since knowledge is no longer an end but a means to creating better problem solvers and encourage lifelong learning. Problem-based learning is becoming increasingly popular in educational institutions as a tool to address the inadequacies of traditional teaching. Since these traditional approaches do not encourage students to question what they have learnt or to associate with previously acquired knowledge (Teo & Wong, 2000), problem-based learning is seen as an innovative measure to encourage students to *learn how to learn via real-life problems* (Boud & Feletti, 1999).

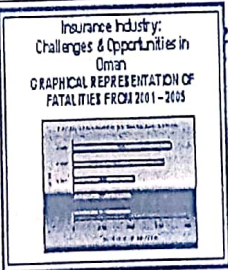


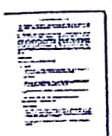
The teacher uses multimedia to modify the contents of the material. It will help the teacher to represent in a more meaningful way, using different media elements. These media elements can be converted into digital form, modified and customized for the final presentation. By incorporating digital media elements into the project, the students are able to learn better since they use multiple sensory modalities, which would make them more motivated to pay more attention to the information presented and retain the information better.



Another advantage of creating multimedia projects in the classroom setting is that when students create multimedia projects, they tend to do this in a group environment. By working in a group, the students would have to learn to work cooperatively and collaboratively, using their group skills and a variety of activities to accomplish the project's overall objectives.

Basic technology as a technical subject in junior secondary school which involves lots of practical works, theoretical material are of little influence compared to multimedia material which makes use of pictures, graphics, graphs, videos and audio to present learning material, through multimedia images of subject matter are crested into the mind of students easily and remains unforgettable. In the traditional method of presenting material, students are limited to what the teacher says in class but with the aid of multimedia students can now think by themselves both intensively and extensively through the guidance of the teacher for example pictures introduced by teachers can be interpreted in several ways but as students interpret pictures through the guide of their teachers their thinking increases.

Various Multimedia Tools

TOOLS	METHODS	EXAMPLES	METAPHORS
Mspowerpoint, Astound Graphics and Flash Slide Show Software	Easy to prepare and it can be prepared with many of the popular multimedia elements like graphs, sound and video.		SLIDE BASED
Macromedia, FlashAuthorware, BPP I Learn and I Pass	Presentation is created using icons to represent different media elements and placed in a flowline.		ICON BASED
Windows Movie Maker, Winampp, Macromedia Director	Presentation is created using moviemaking concepts of casts, sounds, pictures and scores		MOVIE BASED
Adobe Acrobat Reader	Easy to prepare and with word documents if u have Acrobat Reader 5 with many popular multimedia elements like graphs sound and charts		BOOK BASED

Conclusion

In conclusion, the teaching of various disciplines in a classroom has already moved beyond the use of blackboard and chalk into using simple computer programs such as, Microsoft's Power Point to facilitate the delivery of educational instructions. In this context, Nouri and Shahid (2005), studied the views of two student groups comparing the traditional way of teaching with blackboard against the one using Power Point. The findings suggest that teaching with the help of such software as PowerPoint helps students' understanding of a topic; also, it is considered more fun thereby triggering student attention and resulting ultimately, into better student performance in the final exam.

Recommendations

1. It is high time for parent to boost their effort in the role the played in school system by providing more electronics teaching gadgets to complement government functions.
2. Non governmental organization (NGO) should also draw their attention towards this Nigeria education for the benefit of Nigeria's youths.
3. Both local, state and federal government to provide scholarship for the best student in basic technology at the end of their junior secondary school to enable them proceed to study vocational technical education in their senior secondary school.

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