Enhancing Vocational and Technical Education through Multimedia and Hypermedia Instructions in Institution of Learning in Nigeria

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Abstract

Traditional learning methods do not seem to meet the contemporary needs of our information society in Africa. Current status requires innovative ways to support education. New learning modes can provide access to high quality learning most especially in Vocational Technical Education. Vocational Technical Education through multimedia and hypermedia instructions can increase the performance of students. Combine or mix modes of technology such as live virtual classroom, self paced instruction, collaborative learning streaming videos, audio and text can accomplish an educational goal. The more stimulation and the more media is involved, the easier it is to learn. Due to the advances in technology and growth of information, the delivery of knowledge need to be more flexible in linking the learners with the learning resources to support the independent and self learning. Multimedia has introduced the pedagogical strength in facilitating student learning. Multimedia based education program in areas of teaching and learning stimulates new ways in information delivery with concern of accessibility, reusability and individualization to fulfill the needs for different types of learners. Therefore, this paper examines the role of Multimedia and Hypermedia instruction in Vocational Technical Education, Multimedia and Hypermedia Application Strategies to enhance Vocational Technical Education through Multimedia instruction, 21st Century Media-suffused environment. Student-Centered learning in classroom uses of multimedia in vocational Technical Education, ingredient for multimedia instruction, significant of multimedia instruction, constraints to the use of Multimedia Instruction. Finally, conclusions and recommendations were made.

Keywords:- Multimedia and Hypermedia Instructions, Vocational Technical Education, Learning.

Introduction

Traditional learning methods do not seem to meet the contemporary needs of information society anymore. According to Agu (2015), in Nigeria, the approaches used in the teaching and learning of technology subjects have been and still are by lecture method and workshop practice. The theoretical concepts relating to technologies are taught in classroom settings through chalk and talk method or on white boards with or without projectors. The Practical content on the other hand, is taught in workshops using tools, raw materials and production machines often imported from foreign countries. The mode of instruction is often by teachers demonstrations while students learn by imitating the teacher several times until they are able to do it well after a series of trials. The method of evaluating students comprehension in the theory related courses is by paper and pencil while the workshop practice is assessed through process, product skills or combination of the two. Learning was carried out in a designated places at a particular time and by a known tutor (Ayoo & Lubega2010). Aina (2006) observed that oftentimes facilities for engaging students in workshop practice are either in short supply or are not available in the schools. He went further to observe

that some technical teachers who are supposed to groom the students in practical exercises are themselves not experienced and therefore, not m position to pass on the required skills which they do possess themselves. Agu (2004) in a study found that even when facilities are available, teachers may not be in a position to perform well because they do not have the required abilities.

Technology Education in Nigeria has suffered most from the beginning because of adherence to traditional methods of teaching and learning. Teaching and learning is confined to workshop settings where facilities and equipment are the main source of instructional resources. In most cases these facilities and equipment are often originally designed not for learning purposes but for hard core production, hence these facilities and equipment do not possess the inbuilt capacity to reveal some hidden concepts that are rather abstract and complex to the student of technology. Advances in technology all over the world have contributed to the paradigm shift in several areas such as education. Today learning can occur everywhere; far and wide. It is also becoming imperative that learning can no longer be confined to a classroom environment but that any place and any medium can become a source through which knowledge; skills and attitudes can be transmitted and acquired. Especially in Africa, the current status requires innovative ways to support education for all (UNESCO IITE Report 2003). Thus, technology based solutions have been increasingly established to overcome these problems. The need to invent more innovative ways of providing learning is being driven by the changing conditions and unique contexts in which learners find them. Delvin in Larson and Wasserstein (2003) noted that half the world's population is under age 20; we have essentially no hope of educating these young people by conventional means.

New learning modules can provide access to high quality learning opportunities, for a wide variety of students, the vast majority of whom will never have the luxury of a residence based higher education.

According to Downess (2007) learning will increasingly be available not so much in learning institution but in any given environment in which the learners find themselves. Many developed countries have adopted the use of technologies to enhance learning in almost all educational sectors. Innovative learning environment aside ICT, the organization of the learning situation and the ability of teachers to use technology to support pedagogical learning objective that change and transform traditional learning activities is also important.

According to Brennan (2004), there have been six major waves of technology innovation applicable to both developed and developing countries. These are writing considered as the first with phonetics alphabets. Next was printing with moveable type. Third was broadcast media such as film, radio and television. The fourth was a range of mass media storage devices including audio cassette videotape and CD. Fifth was the mass produced computer with CD-ROM. The sixth is the current networked, Web-based e-learning revolution with each of these innovations, new forms of multimedia and hypermedia instruction arose.

To understand multimedia and hypermedia instruction it will be necessary to understand the concept of teaching and learning. Teaching involves transfer of knowledge from an individual to another. Atsumbe, Raymond, Umar and Ajunwa (2015) stated that teaching is a process of impacting or providing knowledge or skills that implies an educational activities involving transfer of knowledge from one individual to others. VanDam in Ayoo and Lubega (2010) learning occurs to a large extent through education and training. It was stated that training is change in skills and education as a change in knowledge. Learning is the process of acquiring new skills and knowledge with the goal of improving performance. The Federal Republic of "Nigeria (FRN) in the National policy of education recognized Technical Vocational Education (TVE) as that aspect of education

which leads to the acquisition of practical and applied skills as well as basic scientific knowledge (FRN 2004).

Osifeso in Audu, Abdulkadir and Kagara (2013) defined TVE as a type of education designed for preparing the individual and learners to earn a living (to be self-reliant). It also increase earning in an occupation where technical information and understanding of the laws of science and technology application to modern design production, distribution and services as essentials for positive change. According to Dike (2009), TVE is that aspect of education which leads to the acquisition of skills as well as basic scientific knowledge.lt is a planned program of courses and learning experiences that begins with exploration of career options, supports basic academic and life skills and enables achievement of high academic standards, leadership, preparation for industry defined work and advanced continuing education (Maclean & Wilson, 2009).

More national consciousness and growing awareness of the vital role of vocational and technology education in national development is important. TVE grants participants with adequate knowledge and skills needed in subject areas to enable them contribute positively to the growth of the economy. The increase awareness of the relevance of vocational and technology education in national building has made both the government and the private sector to take a more practical step in the establishment of special schools and technology institutions saddled with the responsibility of training and producing the required manpower that would move the economy. To this end, the government of Nigeria for the purpose of functional and administrative differentiation has classified technology education to comprise four distinct types and levels of education thus: (i) pre-vocational education or general vocational education, obtained in secondary schools, responsible for the role of production of manpower as semi-skilled for specific job training in apprenticeship or further formal education; (ii) vocational education, obtain at technical colleges and vocational centers, responsible, for the role of producing craftsmen and master craftsmen (low level manpower) (iii) technical education, obtained at polytechnics/monotechnics to prepare technicians/technologists (middle-level manpower) and (iv) professional education, obtain at university level and responsible for the role of producing professionals (high-level manpower) Federal Government of Nigeria (FGN, 2004).

The pre-vocational education is offered in the Junior Secondary through subjects such as basic technology, business studies and home economics secondary level, they are studied in their discrete component Agriculture, Applied Electricity, Commerce, Computer Studies Management, Technical Drawing, Shorthand, Typewriting. The technical schools are offered as trades, these include but not limited to; Mechanical Engineering Craft, Computer Craft, Building, Wood Work, Beauty Culture, Business, Electrical Engineering. While education obtained at polytechnic and university levels are more professional courses to produce middle and high man power skills.

Given the importance of technology education to nation's development, the extent to which students have embraced these noble objectives of studying of technology based subjects in these institutions is not encouraging. In similar vein, Kennedy in Atsumbe et al (2014) observed that students who have chosen to study in these institutions are graduating with unsatisfactory results in their trade subjects. It was further observed that the skilled manpower needed for optimum development of the various facets of the nation's economy as stipulated in the National Policy on Education document is gradually disappearing due to unsatisfactory performance. In support of the above Idoko (2007) observed that the traditional teaching method prevalent in Nigeria schools have been found to contribute to students poor performance. In the same vein, Ogulana (2012) affirmed that the traditional method of teaching technology education based subjects employed in

most schools in Nigeria in this 21st century cannot meet the growing pressure of today's workplace technology. To this end, Asthana (2012) and Ho (2009) suggested that one way to bring about a more practical change in the teacher-centered approach of teaching to a facilitated and students centered approach is through the incorporation of multimedia instructional approach into the teaching and learning of vocational and technology education subjects Incorporation of multimedia in teaching and learning requires hardware and software application. Hardware are the physical things that one can feel and touch in the multimedia classroom whereas software are the programmes that help integrate media elements through the computer to produce multimedia content. Ho (2009) observed that the incorporation of hardware and software into teaching and learning of technology courses has proved effective for encouraging participation among students. To Zimmer in Atsumbe et al (2014) the incorporation of hardware and software in teaching and learning allows all students especially those with learning difficulties to better understand concepts even before reading the text of a lesson. Ho (2009) added that with the infusion of hardware and software technology teaching of technology based courses traditional materials can be translated into interactive electronic form through use of multimedia authoring tools. Multimedia is the reregulating of text, graphics, animations, audio, sound using computer in an integrated manner.

With the introduction of modem technology to deliver learning, several terms have been introduced among which are distance learning, e-learning, online learning, computer based learning, web based learning. Over some years training of professionals have become pragmatic in their approach to technology based media by using it to augment traditional forms of training delivery, such as classroom instruction and text based material (Brennan, 2004), Today most of these trends, have led to issue of multimedia and hypermedia instruction even in Vocational Technical Education. It means combination of information presented to different senses, like seeing, hearing that can easily influence by user or as a combination of static and dynamic media in one interactive computer application called multimedia/hypermedia application.

Multimedia/Hypermedia and Application

The word "Media" has its origin from the root word medium which means the middle, state or condition, a substance for transmitting an effect; any intervening means, instrument or agency that is used to communicate information. When several means or elements are incorporated into the transmission of the information such are referred to as "media". Therefore the word Multimedia which is a compound word simply means "Several Media". This implies the use of combination of several aspects or elements of media to convey one several pieces of related information (Gupta, 2008). According to Williams (2009), multimedia in computers science is the presentation of information using the combination of text, sound, pictures, and animation and video effects. Multimedia applications according to this author are essentially computer designed programs which are stored on compact discs.

Multimedia instruction could also mean method that mixes various leaning events including the traditional face-to-face classroom activities, live e-learning and self pace learning combining instructional technology with tasks to create harmonious learning. Therefore multimedia instruction in vocational Technical Education is a kind of learning method that include variety of tools that create flexible rich learning environment that simulate and maximize the learner's potential to learn.

Multimedia is using sound picture, and film in addition to text on a screen. It is the act of using several different ways of giving information or several different materials while hypermedia is a system that links text to files containing images sound or video.

Therefore to enhance teaching and learning of vocational technical education interactive multimedia and hypermedia instruction are important.

Hasebrook (2002) defined multimedia technically as combination of static and dynamic media in one interactive computer application. Looking at it from, a more psychological point of view, multimedia could also be defined as a combination of information presented to different senses (like seeing, hearing, touching) that can actively influence by the user (Kozma 1994). Important facts and complicated Structures could be understood at a glance using multimedia, Whereas the use of hypermedia is often recommended when learning task requires structure and fast information access.

Hasebrook (2000) explained Naive theories of multimedia learning that the more stimulation and the more media is involved, the easier it is to learn. According to Hasebrook, there is hardly a multimedia book or oral presentation that does not refer to charts or other visual aids, because "hearing and seeing" result in better retention rates as compare to hearing alone. Hasebrook (1995) stated that this theory assumes that there are simple theories of effects of media upon learning. According to Hasebrook, many of these simple theories of multimedia refer to the famous book, Audio-Visual methods in teaching including vocational Technical education by Edgar Dale which was first published in 1946. Of course, Dale was thinking of musical records, motion pictures etc. rather than multimedia applications. He stated that "symbolic information like words and graphic, are far from direct understanding "iconic Information" like photographs, movies or demonstrations are much more intelligible. Direct information derived from simulation, experiment, or goal-oriented experiences are the best way to learn.

Agu (2015) said perhaps, the line that separates multimedia and hypermedia is probably very thin and that is in the speed with which hypermedia are operated.

Hypermedia, on the other hand, is the use of texts, data, graphics, sounds, video and animation into documents or files that are linked in an associative system of information and retrieval. It was further said it contains cross references called hyperlinks that connect files with related information allowing user to easily move or navigate (shift) from one document to another through these associations. According to Barba in Afoar, Agishi, and Unor (2015) Text, audio, graphics and video are interconnected to each other creating a compilation of information that is generally considered as non-linear system. According to the authors, the world wide web is the best example for the hypermedia, where the content is most of the time interactive hences non-linear. Hypermedia content can be developed using specified software Adobe flash, Adobe Director and Macromedia Authorware. Some business software as Adobe Acrobat and Microsoft office suite offers limited hypermedia features with hyperlinks embedded in the document itself. Hypermedia may provide a very good method of teaching and learning in all facet of education, as it eases so many learning processes.

21st Century Media-Suffused Environment

The advancement of technologies has stimulated the production of more interesting and effective approaches in teaching and learning context. According to Leow and Neo (2014), the resulting educational innovation have driven more creative developments for the interactive technologies in various forms such as computer base instruction (CB1) intelligent tutoring system (ITS) integrated learning system (ILS), computer aided assessment and computer mediated communication. These new concepts and the development show that the advances in the digital era have broadened the learning processes and enabled higher level of learner interactions in order to make learning more meaningful for overcoming the insufficiency in learning (Dembo & Seli, 2012)

According Leow and Neo (2014) in the blueprint of enculturation of life-long learning for Malaysia2011-2020; it states that in conjunction with the advances in technology and growth of information, the delivery of knowledge needs to be more flexible in linking the learners with the learning resources to support the independent and self managed learning. It was highlighted that in gearing toward the status of developed' nation by 2020, Malaysian education system need to build two elements; creativity and innovation as the enablers to equip the citizens toward the high-income level. And such innovative learning in vocational technical education design at institutions of learning is needed to empower the strength of 21" century learner. Educators are trained to transform from the conventional teacher-centered approach to student student-centered learning approach with technology backed learning environment which can better motivate students to participate and interact with others in the learning process. According to Manson (2007) a well-planned learning environment can enhance the quality of learning and encourage students to demonstrate their understanding in the learning activities, so students are given more choices to determine the learning experience. This helps the student to strengthen self-esteem and develop high level thinking skills in a learning community. According Leow and "Neo (2014) as multimedia-mediated content is incorporated into the learning environment, the information-rich presentations makes the learning instructions more effectively than presenting through a single medium in learning, so that the student can obtain the information more meaningfully and repeatedly through different media and choices.

Student-Centered Learning in Classroom

It has been noticed that due to the advantage of cost-effectiveness in conveying large amount of information, conventional classroom learning is still being practiced frequently although this approach was found to be the least effective teaching method and less capable to support self-paced learning and interactions between instructors and learners (Leon and Neo 2014). According to Dale 1969 in (Leow and Neo 2014), learners can retain 5% of what is heard, 10% of what is read,20% of what is obtained in audiovisual presentation and the retention rates can be increase to 70% and above when encouraging to do hands-on-practical work in learning process. Most especially in Vocational Technical education since it is a planned program of courses and learning experiences that begins with exploration of career options, supports basic academic and life skills and enables achievement of high academic standards, leadership and continuing education.

Uses of Multimedia in Vocational Technical Education

Research has shown that in recent years, multimedia has introduced the pedagogical strength in facilitating student learning and supplementing learning with liveliness as it adds richness and meaning to the information presentation with the use of more than one medium (Shark, 2005; Asthana, 2009). Multimedia involves the synchronization of media in producing the media-rich output and is arranged in some chunks which are linked by the hypermedia.

Students can navigate to the source of information in a short time, building the connection between relevant topics and construct their knowledge by associating to the meaningful information. According Leow and Leo (2014) today, the use of multimedia-based educational program is getting more popular in many areas of learning and training as it stimulates new ways in information delivery with concern of accessibility, reusability and individualization to fulfill the needs for different types of learners, but not just limited to conventional teaching and learning methods.

Some Ingredients for Multimedia Instruction

In the past the classroom instructions were limited to physical classroom format (Lecture & Labs etc) books or handout. But in 21st century this method has gain improvement among which are mention by (Brennen 2004) as:

- Synchronous physical formats: Instructor-led classroom & lectures, Hands on labs & workshops, Field Trips.
- Synchronous Online formats (Live e-learning): E-Meetings, Virtual Classrooms, Web seminars and Broadcast, Coaching, Instant mess aging.
- Self-Paced, asynchronous formats: Documents & web pages, Web/Computer-Based Training Modules, Assessment/Tests & Surveys, Simulations, Job Aids & Electronic Performance Support System EPSS, Recorded live events, Online learning communities and Discussion forums.

According to Atsumbe et al 2014 some educational classification of multimedia are:

- **Text:** Text acts as the keystone typing all the other media elements together. It is well written text that makes multimedia communication wonderful (Asthana, 2012). Text provides letter means of presenting vocational and technology education courses content information on screen.
- **Animation:** This is the collection of independent picture together through a computer to form a continues motion. Animation is used to show changes in state over time and with vocational and technology education courses, information can be present slowly to students so they have time to assimilate it in smaller chunks.
- **Video:** Video is the technology of capturing recording, processing, transmitting and reconstructing moving pictures, electronic signals or digital media primarily for viewing on television or computer (http://learningtechonology.wikispaces.com)
- **Sound:** Sound can be described as the vibrations that travel through air and can be heard by human (http://learningtechnology.wikispaces.com). Sound is used to provide emphasis or highlight a transition from one page to another (Asthana, 2012). This approach is used in a variety of ways, all based on visual display of a complex image paired with a spoken explanation (for example, for video of how current move in a conductor can be paired by a spoken explanation plays in the background) increases students imagination stimulus.
- **Graphics:** Graphics provide the most creative possibilities for a technology learning session. They can be photographs, drawings, graphs from a spreadsheet, picture from CD-ROM, or internet or hand drawing work incorporated through the scanner. The capability of recognition memory for picture is almost limitless. The reason for this is that images make use of a massive range of certain skills; color, form, line, dimension, texture, visual rhythm and especially imagination (Asthana, 2012).

Significant of Multimedia and Hypermedia in Vocational and Technology Education Instruction

Multimedia instruction is significance to VTE. Several studies according to Atsumbe et al 2014 indicates that multimedia can improve learning and retention of materials taught during technology session or individual study period, as compared to traditional lectures or study materials that do not use multimedia. In support of the above, Ludwig, Daniel, Froman, and Mathie (2004) stated that as evidence in Najjar (1996), the improvement is attributed mainly to the ability of multimedia to facilitate dual coding of the information presented in two different modalities (visual plus auditory). It was also affirmed that multimedia that combines visual and verbal knowledge help to stare information into long-term memory thus facilitates encoding and retrieval process. Dual coding theory states there are three distinctive levels of processing: visual system; representational

and associative. It was further explained that the representational processing connects the incoming stimuli from the environment to either the verbal or visual system, associative processing constructs connects within either of the verbal or visual system and referential processing builds connection between the verbal and verbal and visual system.

Classroom utilization of multimedia is an attention gaining teaching strategy that helps to gaining attendee and reduces the processing demand in short-term memory. It also facilitates encoding and retrieval by connecting information and providing alternative retrieval path-ways.

Some tools use in multimedia and hypermedia instruction

Tools are important in multimedia instruction. Atsumbe et al mention few of them as: Computers, Projector, Internet, Interactive whiteboard, Computer software, Removable Disk Devices, DVD player, Digital camera/scanner

Constraints to the used of Multimedia

It is challenging to produce a good courseware as the development requires more studies and planning incorporating multimedia-enabled learning methods, into the existing practices without creating unnecessary frustration in the learning process Mishra and Sharma Mantin & Klein, in (Leow and Neo2014).

Agu 2015 have identified some of these common challenges to include:

i. Lack of ICT literacy among many teachers and students
ii. Poor internet connectivity in the country
iii. None affordability of ICT gadgets
iv. High cost of internet connectivity
v. Lack of local companies which develop multimedia content
vi. Lack of local companies which produce and deploy multimedia technology to the global network
vii. Lack of or irregular supply of electricity to power ICT infrastructure.

Some Strategies to Enhance Vocational and Technical Education through Multimedia and Hypermedia Instruction according to Leow and Neo 2004 include

- **Culture:** people should have access the system and freedom to use it regarding information and communication what should be the cultural attitude towards learning and whether it differs in learner's age or gender and look at social and cultural accepted way of learning.
- **Communication Infrastructure:** for e-learning infrastructure like electrical power connectivity, network hardware and software to deliver e-learning be made available.
- **Human Infrastructure:** Teachers of vocational Technical Education should be well equipped for the use of multimedia instruction skilled and supportive staffs are needed. Skilled personnel to be able to use all the necessary learning tools, equipment to access the needed knowledge to student. Teachers should be computer literate.
- **Personal Preparation of the Student or Learners: ensure** that the learners are ready, be able to read and communicate well in English.
- **Content:** use of multimedia and hypermedia should correspond with and to the content of what is being taught at that time.
- **Quality of Instruction:** quality of methods use in delivery, quality of the material use should be put into consideration. Teachers should be conversant with how the learning materials are designed and use and are they acceptable standard.
- **Regulation concerning use of Multimedia and Hypermedia:** is also Important and eventually one should be able to evaluate the effectiveness of the process.

Conclusion

Based on the discussion from the literature it will be notice that incorporation of a sound instructional multimedia model, creative media content that centered on the students learning environment, will engage and motivate students in their learning process. It is evidence that multimedia in education process is important to enhance teaching and learning of vocation and technology education subject, Also to provide an opportunity for increase in students classroom engagement. For teacher, it reduces rate of talking in the classroom. It also help administrators to reduce expenses of purchasing different instructional tools and equipment.

Recommendations

From the significance and challenges identified in this paper, the following recommendations are made:

i. Provision of facilities should be made and involvement of training experts to schools to upgrade the capacity of teachers and students.
ii. Collaboration with network providers should be made to ensure better internet connectivity in Nigeria, especially in rural areas.
iii. Government should encourage local companies to develop education related multimedia content.
iv. Government should encourage and where necessary sponsor local companies to produce and deploy education - related multimedia technology to the global network for educational purposes.
v. Deliberate effort should be made to improve the supply of electricity to support infrastructure particularly in rural schools. Where electricity supply to rural schools is not feasible, solar powered units should be mounted to ensure regular supply of power to ICT systems.
vi. Technical education institutions in Nigeria should include multimedia education in their curriculum so that technical teachers could be trained and equipped with multimedia development and designed techniques on graduation for competent classroom application purpose.
vii. Conducive learning environment should be provided

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