Multimedia: A Veritable Tool for Teaching Vocational and Technology Education Based Courses

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Abstract

Multimedia application has potentials in enhancing student learning. Multimedia resources are increasingly been embraced in education around the globe due to its numerous significance in teaching and learning. Though still new in Nigeria education system multimedia offers exciting possibilities for meeting the need of the 21st Century learners, if properly designed and implemented. This paper unveil the benefits of multimedia created classroom to the students, teachers and the school administration at large as compared the traditional instructional method. The paper therefore discussed the role and significance of multimedia in improving students learning, the principles governing the selection, preparation and utilization of multimedia resources, peculiarity of teaching vocational education ,multimedia tools that promote the teaching and learning of vocational and technology education based courses, significance of multimedia tools or resources in teaching of vocational and technology education based courses in Nigeria educational system and a number of recommendations were proffers among which are policy making pertaining training of technology teachers in multimedia design and its application in the classroom, encouragement of technology teachers to employ multimedia in the delivery of technology education based courses due to its efficiency and learning enhancement.

Introduction

Teaching is a process of imparting or providing knowledge or skill that implies an educational activity involving transfer of knowledge from one individual to others. Teaching in vocational and technology education is seen as an interactive process which takes place between teacher and the learner. This occurs during teaching in the classroom, laboratory and workshops aimed at imparting vocational skills and technology education ideas.

Vocational and technology education is necessary for success in all human Endeavors. It provides individuals with basic knowledge or skills necessary for entry into a particular vocation (Oni, 2007). One of the most important features of technology education is its orientation towards the world of work, and the emphasis of the curriculum on the acquisition of employable skills. Vocational and technology education prepares its recipients in various occupational areas. It prepares the individual to fit into a known technological occupation such as automobile technology, carpentry, wood work technology, metal work technology, electronics, electrical work technology. As shown in the Federal Ministry of Education Sector Report (2003) and National Policy on Education Document (FRN, 2004), the fundamental purpose of vocational and technology education is to produce all types and levels of technological manpower required by the economy so as to extend the realm of practical human possibilities through research. The survival of Nigeria as a nation in the advancing world of technology requires progress towards these goals.

With more national consciousness and growing awareness of the vital role of vocational and technology education in national development, prompted the government of Nigeria to include technology education based subjects in her curricula right from the primary to the tertiary level of the education system so as to grant participants with adequate knowledge and skills needed in such 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) (FME, 2003).

The pre-vocational education is offered in the Junior Secondary School as broad fields such as basic technology, business studies and home economics. At the senior secondary level, they are studied in their discrete component subjects such as: Agriculture, Applied Electricity, Commerce, Computer Studies, Nutrition, Home Management, Technical Drawing, Shorthand, Typewriting. The vocational courses at technical schools are offered as trades, these include but not limited to; Mechanical Engineering Craft, Computer Craft, Building, Wood Work, Hospitality, Textile, Printing, Beauty Culture, Business, Electrical Engineering. While technical and professional education obtained at polytechnic and university levels is aimed at training for growth in these trade areas necessary for economic development of the nation.

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 (Oriahi, Uhumuavbi, and Aguele, 2010). In similar vein, Kennedy (2009) observed that for students who have chosen to study in these institutions are graduating with unsatisfactory results in their trade subjects. He 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 an investigation, Ramanair and Sagat (2007) revealed that instructional approach have significant effect on students' choice and performance in such areas. 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 employ 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 (2003), 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 defined as the combination of various digital media types such as text, images, sound, and video combine to form an integrated multi-sensory interactive application or public presentation (Ho, 2009). For vocational and technology education instructional purpose, multimedia is used to mean a multiple media or a combination of still pictures, sound, motion video, animation and/or text items combined in a product whose purpose is to communicate information in the teaching-learning of technology education subjects. Unlike the traditional classroom in which the flow of information is strictly from the teacher to students, the multimedia approach of teaching employs the computer as a mean of transmitting specific subject matter in which communication between the teacher and students is a two-way traffic. Soe, Stan and Chang (2012) observed that in the multimedia system, the flow of information is basically from the computer to the students. By assigning individual computer, students' participation is improved. Multimedia places tremendous role on learning and teaching. It helps improves teaching and learning practices. One of its significant roles is that by use of electronic display the traditional chalk board is replaced thereby enabling the visualization of digital audio effects (Ho, 2009). It also helps the teacher to incorporate sounds, graphics and video into an existing presentation. Less time is therefore invested and the rate of teachers' talking and the stress it takes in explaining the abstract nature and complexity in technology concepts is reduced (Khairezen, 2011).

Furthermore, for the students Zimmer (2003) and Kylie (2012) observed that multimedia help serve as entertainment in the classroom and picks the interest of all ages and groups. It also helps students to develop technical skills that cannot be gotten from reading of textbooks. Multimedia presentation such as those that incorporate sound and graphics allows all students, especially those with learning difficulties to better understand technology concepts even before reading the text of a lesson (Zimmer, 2003). Davies and Crowther (1995) added that the interactive feature of multimedia allows a wider range of flexibility in learning and stimulate students' engagement in learning of technology based courses. Zimmer (2003) added that on the part of the school authority a multimedia based classroom helps the school authority to reduce finance spent on purchasing many different tools, specialized carts, and information on how to coordinate these different systems.

Summarily, multimedia application in teaching and learning of vocational and technology education in Nigeria if properly applied will help ease the bottle neck that students usually encounter in the traditional classroom which transfer complete class

autonomy to the teacher. Most importantly, the difficulty in meeting the need of individual students that the teacher encounters in the traditional classroom is reduced, since every student is actively involved. In addition Davies and Crowther (1995) observed that in order to increase students motivation, courseware can involve built-in questions, problems and test and programmed so that it provides feedback as it pulses question and students provides answers. With multimedia, students take responsibility of their learning pace since multimedia materials can be replayed at anytime. Also it improves class efficiency and curtails huge finance budgeting for the purchase of instructional tools and equipments by administrators.

Educational classification of multimedia

In order to enable learning take place in technology learning environment with multimedia tool a number of components is involved. Asthana (2012) observed that hardware and software are only part of the requirements. He stated that multimedia learning integrates five types of media to provide flexibility in expressing the creativity of a student and in exchanging ideas. These include:

Text: Out of all of the components, text has the most impact on the quality of multimedia interaction. Generally, text provides the important information. Text acts as the keystone typing all the other media elements together. It is well written text that makes a multimedia communication wonderful (Asthana, 2012). Text provides letter means of presenting vocational and technology education courses content information on screen.

Animation: Animation concept is a key component of multimedia. This is the collection of independent picture together through a computer to form a continues motion (Kylie, 2012). 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. Animation when combined with user input enables student to view different versions of change in such information over time depending on variables.

Video: Video like animation is a key component of multimedia and results in greater interest and enjoyment for learner. 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://learningtechnology.wikispaces.com). It enables vocational and technology education concepts to be captured either in moving or still format and viewed through the television or a computer.

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). Sound synchronized to screen display enables vocational and technology teachers to present lots of information at ones. 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).

Considering these components Teow (2005) observed that multimedia tool may be classified by the organization into some coherent programmes some or all of these elements which he gave to typically mean one of the following:

➢ Text and sound
➢ Text, sound and still or animated graphic image
➢ Text, sound and video images
➢ Video and sound
➢ Multiple display areas, images or presentations presented concurrently
➢ In lives situations, the use of a speaker or actor and "props" together with sound, images and motion video.

The significance of multimedia in teaching vocational and technology education based courses

The primary aim of teaching technology courses is for the purpose of learning such subjects being taught. The concern of an effective technology teacher is therefore to determine ultimately how students learn, what propels learning, and method of teaching to be utilized that would best improve technology subjects learning.

Several studies 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).

Khairezan (2011) affirmed that multimedia that combines visual and verbal knowledge help to store 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, associative and referential (Rieber, 1996) cited in Khairezan (2011). He 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 attention and reduces the processing demand in short-term memory. It also facilitates encoding and retrieval by connecting information and providing alternative retrieval path-ways (Khairezan, 2011).
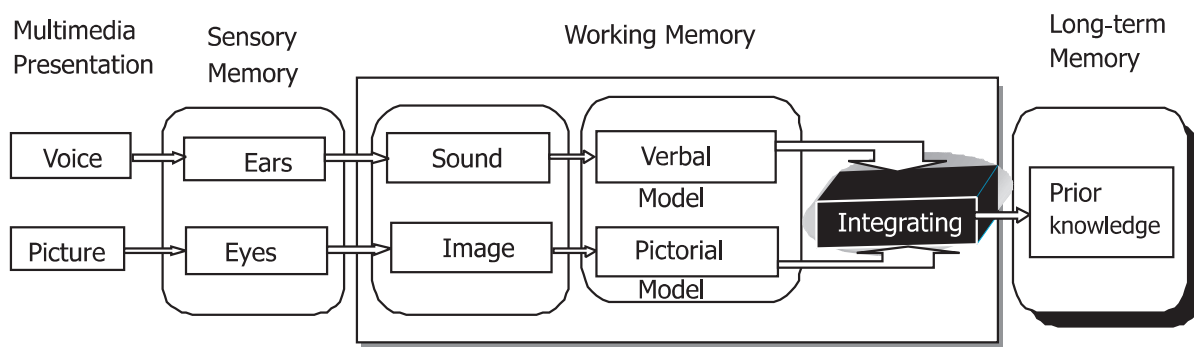
Multimedia information dual processing model base on Mayer

There is enormous significance of multimedia in teaching technology based subjects some of which includes:

➢ Through video and sound, a real-life scenario can be conveyed and then the interactive and non-linear access capabilities of multimedia can enable the students to explore the situation as if for real (Davis and Crowther, 1995);

➢ Language barrier can be overcome by using any of the language transition facilities, thereby allowing students to use their knowledge in their own language and then translate for the technology educator to understand or vise-versa;

➢ Multimedia instruction increases learner's class autonomy by allowing the students to review material at their own pace and keeping with their own individual interests, needs and cognitive processes (cemca.org/EMHandbook);

➢ Multimedia addresses many different learning styles simultaneously. It is a built-in way to differentiate instruction to meet the need of many students;

➢ Multimedia has a cognitive function which improves learner's retention by assisting knowledge transfer and developing internal network of knowledge (http://learningtechnology.wikispaces.com);

➢ Information retention is enhanced by the effective function of multimedia that is, the ability to sustain the learners interest, improving and stimulating the learner's senses (Person, 2012);

➢ Students acquire knowledge of tasks and applications that require them to comprehend text and data, apply tools of their choice, analyze factual and fictional information by a process of synthesis and evaluation (Carol, 2012);

➢ Multimedia application empowers technology students to create and design rather than absorbing representation created by others (tech4learning.com);

➢ Multimedia allows technology students to function as designers, using tools for analyzing the world, accessing and interpreting information, organizing their personal knowledge and representing what they know to others (tech4learning.com).

Principles of selection and utilization of multimedia in teaching technology courses

Learning is an outcome of teaching. When we teach it is expected that learning should occur. In multimedia classroom the amount of materials to be learnt depends on the teacher's personality and background knowledge in media utilization. With constantly advances in technology and the many user friendly applications available, multimedia can easily be prepared and presented using Power Point slides, videos, animated graphics and audio among other options. Knowing how to incorporate these multimedia tools applications will result in a successful presentation (Harms, 2012).

A poorly presented multimedia may constitute a great nuisance in the learning of technology processes. In this regard Ludwig, Daniel, Froman and Mathie (2004) asserted that the rationale for using multimedia tool in teaching technology based subjects should be aimed at helping students to:

  a) raise their interest level
  b) enhance their understanding
  c) increase their memorability; of technology concepts
     To achieve this, Ludwig, Daniel, Froman and Mathie, (2004) and Harm (2012) emphasized that the technology teacher need to be guided by some fundamental principles outlined below:

  1) **Prepare a class plan:** The class plan is regarded as the most important resource for the successful use of multimedia tool because it guides the preparation or selection of media and provides the context for each media element.

  2) **Develop the class plan as slide or courseware presentation:** After the class plan has been prepared, the next task is to incorporate the plan into a slideware or courseware through the use of any multimedia presentation software. The media developed or selected should therefore reflect adequately the objectives of the prepared plan.

  3) **Audio/Video need:** Before adding sound or video, it is important you study first of all how it's going to affect your message. If your presentation is going to be slide when you need to speak during presentation it is advisable you don't add voice or sound as you select or prepare your slideshow or courseware because this may compute for audience attention. Video are essential to multimedia presentation. Video purposeful selected or prepared should aim at conveying the original idea. To achieve undistorted information in multimedia involving sound and picture, it is require you add sound to video but don't talk over video.

  4) **Build in some flexibility:** Prepare or select media that allows for some flexibility. One major objection to integrating slideware fully into teaching technology subjects is that it would rob the teachers of their flexibility. Ones developed, teachers think they have to stick to the order which the presentation goes and get through all of the content. So to get around this situation it is advisable to select or prepare multimedia tool incorporated with hot keys for easy navigation.

  5) **Equipment application:** Classroom use of multimedia employs the application of some supporting hardware materials. These hardware equipments may include computer, projector, wireless equipment. To achieve best result, it is recommended that the educator acquaints him/herself with all the equipment needed for presentation.

6) **Facilities needed for the multimedia presentation:** Check with the facility operator to see all the equipment are available and that the manpower sources are all functional. Test the equipments and check your presentation's compatibility with different computers and operating system to prevent complications.

7) **Preparation:** Preparation is the ultimate key to any successful presentation. Rehearse your presentation to increase your comfort, build your confidence and reduce any anxiety you may have. Familiarize yourself with all the technical aspects of your multimedia presentation so you can troubleshoot problems that may arise.

8) **Timing:** Timing is another crucial factor in creating a multimedia presentation. Its importance prevails mostly during Power Point presentation. It is advisable to use manual transition rather than automated timed transition during Power Point presentation. This allows you decide when to advance to the next part of the presentation and gives time to entertain questions from the audience. The time that may be required to move from one multimedia component to another should be calculated. This gives the presenter insight on the time required for his/her presentation therefore, enabling him/her to give fair time to each media component as it flows seamlessly. This will keep the audience engaged.

9) **Teachers' role:** It is advisable that multimedia material should not replace the teacher in a classroom situation. With this understanding teachers will appreciate their primary role to guide learners. The teachers' explanation is important.

These principles when adheld will result a good teacher presentation hence the interest of students will be raised, and students understanding and memorability of vocational and technology education subjects enhanced.

Multimedia tools used for teaching of vocational and technology education
Multimedia has numerous productive tools to create effective media document for class presentation. These tools basically are classified as hardware and software. For the purpose of this paper the following multimedia tools as listed by Pohlmann (2012), James (2012) and Anderson (2012) are discussed:

1) **Computers:** The computer is the main tool used for presentation of multimedia content in the classroom. This is an electronics device which is capable of receiving information in a particular form and performing a sequence of operations in accordance with a predetermined variable set of procedural instructions (programme) to produce result in the form of information as required by the user (teacher) (oxforddictionaries.com//../computer). Computers in the classroom have made a huge impact on the way teachers provide information to their students. With computer teachers have evolved their teaching methods. Instead of adopting the traditional pattern of "word to express" and "chalk board", teachers can now show their students visual and audio materials on electronics display board to enhance their learning (James, 2012).

2) **Projector:** This is another multimedia hardware tool that is as vital as the computer itself. The projector is a device that projects computer output onto a white or silver fabric screen that is wall, ceiling or tripod mounted so as to enable

easy viewing by students. (pc magazine encyclopedia, 2012). It makes it possible for teachers to show a large classroom or auditorium multimedia content.

3) **Internet:** This multimedia tool works in conjunction with the computers. The internet is an extremely valuable resource for technology education teachers due to its ability to provide required information for the teacher efficiently. With the help of the internet, technology education teachers whom may be novices in preparing multimedia content for presentation, with the guiding principles provided such teacher can search, find and download multimedia content that suit their planned objectives on the internet.

4) **Interactive whiteboard:** This is a hardware used as a surface upon which the information being projected is displayed. With the aid of the projector, the computer output is projected onto the whiteboard. Through an assistant the teacher then manipulates the computer from the interactive whiteboard.

5) **Computer software:** To achieve a multimedia content for classroom presentation, computer programme is needed for creating such. These programmes ranges from authoring, editing and presentation software. Some of this software listed by Anderson (2012) is Mpower, Macrommedia Authorware, Macromedia Director (authoring software); Multimedia toolbook (editing software); PowerPoint (presentation software). With the help of these software technology education teachers can effectively combine text, audio, video, graphics and at the same time edit such content which may be a within source or external source content into or as multimedia for presentation.

6) **Removable Disk Devices:** Removable disks are external electronics storing devices. They are compact in nature and can easily be carried on oneself. This is used to save multimedia content presented in the classroom to distribute to students so that they can go home with them and replay lessons as they wish.

7) **DVD player:** Multimedia classroom may require electronic devices such as DVD player. The DVD play is used in conjunction with a television set to play multimedia content contain in removable disk drive if such content is readable by such machines. Its application is majorly needed in schools that may not readily access the computer.

8) **Digital Camera/Scanner:** These tools are used to incorporate external image, graphics, pictures, video and sound into multimedia content.
   The effective use of these tools requires the training of the teacher and students because multimedia project may require application of all or some of these devices depending on the multimedia item that is to be selected for development.

Conclusion

Considering the potentials of multimedia in the education process, it has been shown from studies that it can be used to enhance teaching and learning in vocational technology education. The important of multimedia in the teaching and learning of vocational and technology education subjects has been captured and its implication on the students, teachers, school administrators and at large policy makers in Nigeria's education system. The incorporation of this new technology into the teaching of vocational and technology education based courses will provide an opportunity for increase in student classroom engagement. If properly applied multimedia capable

features are innovations which can enliven the learners' experience. It provides easy learning path way for the students through its interactive features and engages the students actively through individualize learning. For the teacher multimedia eases the teacher's rate of talking in the classroom and increases class efficiency. It helps the school administrators curtail huge financial budgeting for the purchase of different instructional tools and equipment. The awareness of the numerous benefit students, teachers and administrators stand to derive from multimedia classroom will inform policy making in education pertaining training of technology education teachers on multimedia in Nigeria. The incorporation of this new technology into the teaching of technology based courses will provide an opportunity for increase in student classroom engagement.

Recommendations

1) Policy makers in education should make policies pertaining training of technology teachers in multimedia and its application as applied to the classroom.
2) School administrators should be encouraged to channel the huge finance often budgeted for the purchase of instructional tools and equipment to provision of multimedia interactive classrooms.
3) Technology teachers should be encouraged to employ multimedia in the delivery of their lessons due to its efficiency and also since its interactive features are found to enhance learning.
4) One the part of the students, when multimedia learning environment is put in place the students should be encouraged to embrace multimedia learning.
5) Technical education institutes 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.

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