

Relevance of multimedia and hypermedia instructions in enhancing the teaching and learning of industrial technology education

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Abstract

The study investigates relevance of multimedia and hypermedia instructions in the teaching and learning of industrial and technology education. The study adopted descriptive survey design method. A total sample of 140 male and female technical teachers in 14 technical colleges in Benue State was selected out of the population of 280, using random sampling technique. 30 items questionnaire was used to collect data for the study, with four point response options of Strongly Agree, Agree, Disagree and Strongly Disagree with corresponding scores of 4, 3, 2 and 1 respectively. The instrument was validated by three technical teachers from the Department of VTE, Benue State University, Makurdi. Data collected was analyzed using mean and standard deviation. Decision point was put at 2.50, implies that a mean rating of less than 2.50 is "Disagree" while a mean rating equal or above 2.50 is "Agree". The findings revealed that through the use of multimedia and hypermedia helps student store and accessed easily. Based on the findings, it was recommended among others that software for integrating multimedia and hypermedia content should be made available to various institutions and teachers must know how to access relevant multimedia content and share practice in the creation of content appropriate to every learning situation.

Keywords: Multimedia, Hypermedia, Instructional Technology, Technology Education

Introduction

Technology revolution has become a part of the society in which we live. Technology in every aspect helps individual to live better lives and to make much progress in development. Technology deals with a task/problem with the use of scientific knowledge and ideas to embark on practical tasks in production of materials and devices in reducing human suffering and enhancing production for man to enjoy his environment. Momoh (2015) views technology as a process undertaking in all cultures which involves the systematic application of organized knowledge and tangible (tools and materials) for the

extension of human facilities that are restricted as a result of the revolutionary process. Technology landscape has expanded dramatically which include computer assisted instruction, word processing, computer programming as a learning tools, games, simulations, and micro words, CD ROM and video discs, hypertext (digital text in which the reader may navigate related information through embedded hyperlinks), and hypermedia (use of text, data, graphics, audio and video as an elements of an extended hypertext system in which all extended hypertext system in which all system in which all element are linked so that the user can move among them at will (Sadeeq, 2006). When people are offered training through the use of multimedia and hypermedia. They acquire new and improved skills and knowledge that will enable them to perform better thereby enhancing their level of creativity and productivity. This is very essential especially in our today society where importance of Technology is on the increase. Training through these media, will go a long way in bringing close a light at the end of the tunnel for the enhancement of sustainable industrial and technology development in this technological knowledge age. For long -term economic consideration on industrial development for sustainability, students and young graduates must be put into the right frame of mind.

Industrial education is the essentially traditional programme for creating objects out of wood and metal by using a variety of hand tools, equipment, machines and power tools. One of the aims and of industrial education is to enable students to develop a broad range of mechanical skills as well as to allow students to pursue further vocational training for a specific occupation in Industry, agriculture or trade. Industrial technology is considered to be a carrier path that is separate and distinct from that of engineering. Since society is becoming more technologically advance and sophisticated, teaching industrial education evolved in technology education which is the study of technology in order to provide opportunity for students to learn about the processes and knowledge related to technology that are needed to solve problems and extend human capacities. Industrial and technical education focused subject matters such as manufacturing process, technology impact quality assurance and control, materials science, equipment/facilities planning and design, wood technology and metalwork technology, fabrication, engine repair and automobile maintenance, etc. According to Nwokolo-Ojo (2012), the aim of technology education is geared toward preparing students to function in a technologically sophisticated society, involving problem-based learning that relies on mathematics, scientific, and technological principle. It encompasses identifying and formulating a problem. The author further stated that technology education goes beyond traditional industrial arts focus on wood and metalwork and the use of tools and machines to consider a numbers of other technologies. It is inevitable that technology will continue to shape the society and the information revolution ushered in by the internet and advances in the telecommunications sectors has created a smaller world where information, goods, services and jobs can be delivered from and to almost any place across the globe, using multimedia and hypermedia in the teaching and learning of industrial and technology education.

Multimedia is defined as the integration of sound, animation, and digital video with more traditional types of data such as text. It is an application oriented technology that is used in a variety of ways, for instance, to enhance presentations, and is based on the increasing capability of computer to store, transmit, and present many types of information. Some examples of multimedia applications include business presentations, online newspaper, distance education, interactive games, pictures, sounds, motion video, animation and text items combined in a product whose purpose is to communicate information. Multimedia application need computers that support multi-sensory devices. High performance computer systems with high-resolution monitors and audio output are used as multimedia presentation devices. The output devices can present visual materials in the form of text graphics or video, as well as voice and music components. Multimedia and hypermedia defy consensus in their definitions. According to Beckman and Rathswohl (1999) people find the two concepts either too close to distinguish between them, Hypermedia refers to 'linked media' that have their roots in a concept of multimedia. Hypermedia tools focus on the interactive power of computers, which makes it easy for users to explore a variety of paths through many information sources.

Unlike the conventional documents such as books, which one normally reads one page after the other in the order set by the author, hypermedia documents are very flexible and allow one to explore related documents in any order and navigate through them in any direction. For instance, when someone turn on a computer, slot a compact disc (CD) in the drive and listen to music while he or she is working on a paper, the person is experiencing multimedia, or someone is looking at the pictures, taken from digital camera, while surfing the world wide web, following links from one site to another, looking for all types of information is called experiencing hypermedia. The major difference between multimedia and hypermedia is that the user is more actively involved in the hypermedia experience is more passive. Kommers, Jonnassen and Mayes (1992) observed that hypermedia is an enhancement of hypertext, then non sequential access of text documents, using a multimedia environment and providing users the flexibility to select which document they like to view based on their interests. Hypermedia is fundamental to the structure of World Wide Web, which is based on relational database organization. The documents are interconnected as in a network, which activated, which facilitate extensive cross-referencing of related items. Hypermedia systems published as web page documents also represent a powerful technology of the future. Hypermedia offers more control over the instructional environment to the student, and it makes level the playing field among students of varying abilities and enhances the collaborative learning.

Hypermedia has found a place in foreign instruction as well. Hypermedia reading text can be purchased or prepared people can click on unfamiliar words in foreign language and access all the information needed to understand the words for instance, text based translation, definition, grammatical explanations and cultural references. Also audio recordings of the pronunciation as well as images, animations, and video for visualization.

Hypermedia may also be seen as a classification of software programmes which consist of networks of related texts graphic audio files and video clips through user navigated by browser. Hypermedia and interactive multimedia are much alike. The use of hypermedia as a teaching and learning tools that is based on the web system is now rapidly expanding into education. Educators have noted the potential advantages of hypermedia in education including interactive opportunities for the learners, the ability to structure the learners learning approach, the ability of the system to remember, the ability to pursue cross-references, and the increase of the learners control over the subject matters. In other words, hypermedia is a powerful medium and can re-shape the format of conventional instruction, such as textbook and lecture. The concept of computer programmed instructions has continue to be an effective and enjoyable method to motivate and reinforce students for learning .According to Nwokolo-Ojo and Ukadike (2015) it is particularly appropriate for the production of interactive and explanatory educational applications, where large numbers of links and cross-references are provided and the learner can explore his own interests according to previous experience, background and perspective.

Statement of problem

Hypertext (digital text or document) has played a significant role in teaching and learning, since the mild 1980 when the first versions of HyperCard appeared Laudon, Carol & Jane (1994). This presented hypermedia as a technology capable of resolving some of the needs of learners and teachers, using instructional technologies. Students need to gain an understanding of this technology and be able to use and select some of these technologies in learning. While technological education has continue to evolve, certain aspect of traditional arts education were replaced. The reduced time for traditional industrial arts education has limited the number of enrollees in technology education courses because some students are frustrated due to limited time for hand-on tool and material manipulation (Jones & Jones, 2000). As opposed to conventional documents such as textbook, that one normally read one page after the other in the order set by the author, hypermedia documents are very flexible and allow one to explore related documents in any order and navigate through them in any direction. There is need to develop ways to access the technological literacy of students and teachers. Using the World Wide Web as the database, a student can browse through a database consisting of course materials in various formats; images audio and video recording and textual information. Students can also request more information while reading text, viewing illustration or listening to audio presentation. In order to keep pace with the changes brought about by internet advances in the telecommunications sector, schools will need to produce students who are technologically literate and can function in a technologically oriented world. The contents of indusial and technology education curriculum will need to be balanced between advance technology and basic industrial arts skills, because students should be technologically literate by the time the finish high school.

Research questions

1. What are the impact of multimedia and hypermedia applications in teaching and learning of industrial technology education programmes?
2. In what ways could the use of multimedia and hypermedia in teaching and learning of industrial and technology education enhance student's technological skill?
3. What are the challenges facing the successful use of multimedia and hypermedia in teaching and learning of industrial technology education programmes?

Methodology

The study adopted a descriptive survey design in carrying out the investigation. The population of the study consisted of 280 technical teachers in 14 technical colleges in Benue state. Total samples of 140 of male and female technical teachers were drawn using random sampling technique. Thirty item questionnaires on the use of multimedia and hypermedia in teaching and learning of industrial and technology education was used to collect data for the study. The questionnaire was a four point Likert type with options of Strongly Agree, Agree, Disagree; Strongly Disagree having corresponding scores of 4, 3, 2, and 1 respectively. The instrument was validated by three technical teachers from the Department of Vocational and Technical Education Benue state University Makurdi. 140 copies of questionnaire were administered on respondents with the help of two research assistants and were analyzed using mean and standard deviation to answer research questions. The decision point was put at 2.50. This therefore implies that a mean rating of less than 2.50 was 'Disagreed' while a mean rating equal to or more than 2.50 was 'Agreed'.

Results

Table 1: Mean and Standard Deviations of Teachers' Responses on the Impact of Multimedia and Hypermedia in Teaching and Learning of Industrial and Technology Education

S/N	Item Statement	X	SD	Remarks
1.	Using a web browser students. Students can browse through the pages of online newspapers, read articles and view picture	2.77	0.98	Agreed
2.	Readers can perform index search	2.57	0.94	Agreed
3.	It allows student at remote locations to participate in life instructions through video conferencing	2.86	0.93	Agreed
4.	Student can browse through a database consisting of course material in various format	2.61	0.85	Agreed

5.	Educators use these system due to the powerful capability they offer to enhance classroom learning	2.63	0.79	Agreed
6.	Students can use hypermedia projects to complete a project or term papers	2.83	0.70	Agreed
7.	It has ability to encourage students to be proactive learner	2.73	0.70	Agreed
8.	It opens up multitude of creative avenues for both students and teachers	2.7	0.78	Agreed
9.	It helps the learners to make decisions and evaluate Progress	2.72	0.79	Agreed
10.	It improve writing and process skills	2.53	0.97	Agreed

The data on the Table1 above shows respondents' opinion on the impact of multimedia and hypermedia in teaching and learning of industrial and technical education. It was revealed that the respondents agreed with all the ten clustered items. The mean scores for the item statements ranged from 2.55 to 2.86 with the corresponding standard deviation (SD) of 0.70 to 0.98.

Table 2: Mean and Standard Deviations of Teachers' Responses on the Ways to Enhance Students Technological Skills When Using Multimedia and Hypermedia Instructions

S/N	Item statements	X	SD	Remarks
1.	Enhances flexibility of classroom instruction.	3.25	0.94	Agreed
2.	It encourages students to be pro-active learners.	3.00	0.96	Agreed
3.	It motivates students to constant practices.	3.67	0.87	Agreed
4.	It develops creative and critical thinking skills	3.38	0.88	Agreed
5.	It required the learner to make decisions and evaluate progress.	3.63	0.89	Agreed
6.	It makes ways for self-directed learning	3.90	0.78	Agreed
7.	Multimedia and hypermedia helps the teacher to analyze how students approach learning tasks	3.95	0.75	Agreed
8.	It provides platform for group learning.	3.50	0.83	Agreed
9.	It addresses the individual differences in student's cognitive styles.	3.08	0.92	Agreed
10.	It engaging students with the class materials and influencing their attitudes towards learning.	3.00	0.96	Agreed
Grand mean		3.44	0.88	Agreed

The data in Table 2 above shows respondents' opinion on the ways to enhance students' technological skills through the use of multimedia and hypermedia systems. The listed items with mean ratings between 3.00 to 3.95 is agreed, with the corresponding standard deviation of 0.75 to 0.96. The grand mean of 3.44 indicates that generally, the students' technical skill should be enhanced through the use of multimedia and hypermedia models.

Table 2: Mean and Standard Deviations of Teachers' Responses on the Challenges Facing the Successful Use of Multimedia and Hypermedia in Teaching and Learning of Industrial Technology Education

S/N	Item statement	X	SD	Remarks
1.	Inadequate electronic information resources.	4.24	0.72	Agreed
2.	.Lack of multimedia resource centers.	3.01	0.78	Agreed
3.	The requisite software to set up multi-media facilities are very expensive.	4.03	0.71	Agreed
4.	Inadequate power supply	3.76	0.91	Agreed
5.	Poor infrastructural facilities	4.15	0.70	Agreed
6.	Lack of adequate technical skills	3.88	0.75	Agreed
7.	Data transfer and networking problems	4.00	0.74	Agreed
8.	Lack of electronic device for marking multiple-choice questions.	3.59	0.82	Agreed
9.	Inadequate funding especially of recurrent activities	4.35	0.69	Agreed
10.	Outright lack of basic tools and essential instructional materials.	4.03	0.71	Agreed
Grand total		3.90	0.75	Agreed

The result in Table 3 indicated that respondents agreed that all the items (1 - 10) are potential constraints to the successful use of multimedia and hypermedia in teaching and learning of industrial technology education programme. The means scores for the items ranged from 3.10 to 4.35 with corresponding standard deviation of 0.69 to 0.91. This indicated that the opinion of respondents' are not far from each other.

Findings

1. It was revealed that multimedia and hypermedia system of instruction will have a great impact in teaching and learning of industrial technology education.
2. The student's technological skills could be enhanced through the use of multimedia and hypermedia instruction models.

3. The respondents agreed that the items listed in the table 3, are potential constraints to the successful use of multimedia and hypermedia in teaching and learning of industrial technology education programme.

Discussion of findings

The findings of this study revealed that multimedia and hypermedia can elicit the motivation to learn in industrial and technology education subjects. An enormous amount of information can be stored and accessed easily and it certainly has the potentials to extend the amount and type of information available to learners. It was revealed that through the use of multimedia and hypermedia students can browse through the pages of online news, course, read articles, view pictures among others. This is in agreement with the views of Abdollah (2015) who stated that the nature of interactivity and discovery in multimedia and hypermedia learning bears a beneficial boast to the monotony of passive learning. This system of learning supports student-centered strategy whereby learners take responsibility in their learning process. It allows the learner to learn according to their individual pace. The finding also revealed that the use of multimedia and hypermedia help to open up multitude of creative avenues for both students and teachers, Nwokolo-Ojo and Nande (2015) stated that information can be in any medium, for example, text-based, translations, definition, grammatical

Explanations, and cultural references for teachers and students. The study also found out that multimedia and hypermedia enhance the flexibility of classroom instruction, make a way for self-directed learning. It helps to develop creative and critical thinking. The findings also revealed that multimedia and hypermedia help the teacher to analyze how students approach learning task. This is in line with the finding of Enemali (2015) who pointed out that multimedia and hypermedia system facilitate the delivery of the lessons, tracking of the activities of learners, marking and providing feedback to students. Through this system, teacher can organize collaborative learning activities and promote synchronous communication between teachers and students and between students and students, so long as each is connected to the platform. Beichner (1994) pointed out that through multimedia is a useful educational tool, it will be profitable for technical vocational education and training (TVET) students to supplement it with lectures, books, and real world projects. The author further stated that student will learn content, enjoy the learning process and recognize that they have created something worthwhile if the technology learning environment is combined with real world assignments.

The result of this study also found out that multimedia and hypermedia posed a lot of challenges in teaching and learning. This include: inadequate electronic information resources, lack of functional multimedia resources centres, the requisite software to set up multimedia facilities is very expensive, among others. This corroborates the findings. Momoh (2015) who discover that infrastructures are either not available or not adequately

equipped. Many schools that are fortunate to have some computers, do not have the laboratory, for them where laboratories exist, there might not be regular supply of electricity, if at all there is, and thus the usage of this technologies is hindered. According to Olarede (2011) "it is indeed the availability of a number of resources in learning packages, kits or other self-study programme for individualized or cooperative learning will reinforce and strengthen one another so that the learner will achieve predetermined and desired behavioral objectives" (as cited in Nwokolo-Ojo & Ukadike, 2015, p. 245). The use of multimedia and hypermedia resources in the classroom instruction makes it possible to provide a much richer visual presentation, consisting of multi-colored text, graphics, picture, video and animations which help to comprehend the concepts at focus. The findings of this study also revealed that lack of adequate technical skills is one of the challenges militating against the use of multimedia and hypermedia in teaching and learning. Enemali (2015) noted that teachers and students must be supported to engage in hands-on-training wherever they are available. Basic, comprehensive and sustained training and retraining programme for teachers and students will empower them to use technology with confidence. The demand for the use of interactive multimedia and hypermedia instructions are tremendous and majority of the teachers do not know how to use these new technologies to promote educational efficacy, because they are not trained.

Conclusion

Based on the findings of the study, it can be deduced that the use of multimedia and hypermedia as a package for teaching and learning of industrial technology education has great impact or positive effect on students' academic achievement. Learners using multimedia and hypermedia instructions will have control over content, learning sequence, pace of learning time and will also allow them to tailor their experiences to meet personal learning objectives. This media, if effectively utilized, will go a long way to improve the quality of teaching and facilitate students learning. The use of multimedia and hypermedia instruction has a lot of benefits as well as challenges to educators, students and even stakeholders. The search for appropriate skills and competencies is required through training workshops, seminars and conferences. Teachers need to increase their proficiencies both in use of multimedia and how they can integrate computer into classroom instructions. Therefore, as a matter of urgency, the government should address the challenges facing the use of these new technologies in teaching and learning of industrial technology education.

Recommendations

The following recommendations were made based on the findings of the study:

1. Regular workshops, seminars, and conferences should be organized by stakeholders in industrial and technology education for science and technology teachers to update their knowledge, skills, and their teaching strategies.

2. Software for integration of multimedia and hypermedia contents should be made available to various institutions.
3. Multimedia and hypermedia applications should be provided in adequate numbers to enable easy and access to quality information in institutions.
4. Government should give adequate attention to education especially instructional and technology education in term of proper funding as this will help make provision for the necessary contemporary information and communication technology facilities, especially internet services and the services should be subsidized.
5. Teachers must know how to access relevant multimedia contents and share practice in the creation of content appropriate to every learning situations.
6. Deliberate effort should be made to improve the supply of electricity to support infrastructure, particularly rural school where electricity supply is not feasible, solar power units should be mounted to ensure regular supply of power to information and communication technology systems.

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