

Enhancing the Use of Multi-media Instruction for Effective Teaching and Learning of Technology Education Courses in Higher Institutions in Niger state, Nigeria

BY

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Abstract

The study was to enhance the use of multimedia instruction for effective teaching and learning of technology education courses in higher institutions in Niger state. Three research questions and 3 null hypotheses were formulated and tested at 0.05 level of significant to guide the study. The study adopted descriptive survey design. It was carried out in two higher institutions in Niger state, that offer technology education programme, The population of the study was 70 which consist of 49 technology education lecturers and 21 educational technology lecturers at Federal University of Technology and Niger State College of Education Minna. Sampling was not done since the population was not too large. Validated questionnaire was used to elicit responses from respondents. The data collected was analysed using mean, standard deviation and z – test statistics. The findings revealed among others, multimedia facilities such as computer hardware, software, television and projector. Skills required for utilization of are ability to develop programmes/software, maintaining computer packages user interface and computer networking skills. To enhance the use of multimedia instruction, provision of adequate equipment/facilities for production and utilization of multi-media instructional packages, training and re-training of lecturers on production and utilization of multi-media and constant electrical power supply in the institutions. It is recommended among others that, there should be provision of adequate hardware and software and other multimedia facilities/equipment in order to fully implement the use of multimedia instructional packages in schools and periodic training and re-training of lecturers on the acquisition of computer skills to keep them up-to-date in the vast technological world of today and to enhance their ability in the production of graphics

Introduction

The changing nature of skills required for the 21st century is as a result of technological changes. It has become necessary to improve the skills of Nigerian's workforce coupled with the state of nation's economy, necessitate the delivery of high quality technology education. This signified that technology education is more important than ever. In support of these, Uwaifo (2009) recognized the role technology education plays in the lives of adults and young adults in the provision of employment and in supporting the skills needs of sustainable development of a nation.

Technology Education can be described as a systematic way of exposing individual to the practical task for developing and producing goods and services to meet the needs and wants of man. It is basically an occupational education. It is the total experiences of the individual whereby he or she learns successfully for gainful occupation. The programme is based on activity oriented instruction which enables students to reinforce abstract concepts with concrete experience. Technology Education is further viewed as a discipline for the study of the application of knowledge, creativity, and resources to solve problems and extend human potential. Technology Education aimed at providing the technological literacy, knowledge, skills and attitudes necessary to become competent, contributing and productive members of society (Atsumbe & Saba, 2008). It prepares citizens who are able to direct, control and manage their technological environments. They are also able to respond to the needs of business and industry for trained workers and managers. Technology Education incorporates many attributes that are important for the preparation of students for lifelong learning in a technological society. These include the unique relationship between theory and practice; invention and innovation in the efficient and safe application of

processes, materials and tools; a multiple solutions approach to technological problems; activity-oriented laboratory experiences incorporating the reinforcement of abstract concepts with concrete activities; and a combined emphasis on "know-how" and the "ability to do" (Ma'aji, Ohize, Saba, & Tsado, 2010).

According to Uwaifo (2009), he noted that education unlocks the door of modernization but it is the teacher who holds the key to the door. He further advocated that a nation that is in quest of technological development should turn to the schools for solution. Teachers are the hub or pivot on which any successful educational programme revolves. The development of the economy and crave for self-reliance and self-sustainability is the driving force for acquiring technology education. Therefore, it would be possible if a system is developed to make learning more interesting, involving and permanent to the students in the various aspects of educational programme. The concepts of teaching and learning are most central to education. Kalusi (2005) defined teaching as a way of giving instruction to somebody or causing somebody to know or be able to do something. It is also regarded as a skill for promoting performance in learning. Okon (2003) viewed it as a conscious and deliberate effort by a mature or experienced person to impact information, knowledge, skills and so on, to an immature or less experienced person with the intention that the latter will learn or come to believe what he has been taught. Nwosu (1995) explained teaching as an attempt to help someone acquire or change some skills, knowledge, ideal or appreciation. One of the cardinal objectives of teaching is to assist learners develop physically, intellectually, emotionally, morally and socially in a manner that he or she will be able to exploit his potentials maximally.

Learning is a change in behaviour due to experience. It is a process by which behaviour is initiated, modified or changed. Ogwo and Oranu (2006) and Okoro (2006) defined learning as the process by some activities enable the learner acquire experience that tend to influence (change) his/her future behaviour; provided that the characteristics of the change in behaviour cannot be explained on the basis of negative response tendencies, maturation or temporary states of the learner. They further outlined some basic facts underlying how individual learn in technology education programmes and this includes the following: Successful learning stimulates more learning while failure to learn and understand discourages further learning, learning is best accomplished when the learning environment is well managed. The classroom environment has to be made conducive for learning to take place. One learns best when the content being presented is appropriate, relevant and appealing to more than one of these senses – sight, hearing, smell, taste and touch. The utilization of more than one of these senses will aid memory and enhance interest in the content being presented and learning requires motivation since interest is necessary for effective learning. This calls for the use of information and communication technology (ICT).

Information technology has become a hub of modern day life. Its impacts are visible in the area of education, technology, economic and others. ICT has turned from being a technology of communication and information to a curriculum creation and delivery system for teachers and learners. Among recent innovations in the education system, the introduction of computers in classrooms is often referred to as the most significant innovation. The arrival of computers, tablets, and the Internet has led to the re-thinking of many traditional teaching practices and is generally seen as an opportunity for improvement (The Economist, 2013). Students who enter classrooms today have been part of a multimedia world since birth. Students today were able to insert videos or DVDs of children programmes into the appropriate devices for viewing from the time they were three years old. If they want to know something, they search the Internet. It should not be surprising to us that these same students have difficulty sitting in classrooms taking, as the major sources of information gathering. For the majority of students who are visual, just hearing the information is not enough; they need to see it and experience it. The researchers lament the fact that students perform poorly in mathematics and yet this subject primarily is taught by lecture and homework (drill and practice). If we can find ways to help these students see how the mathematics works and how it is applied to the real world, we are more likely to have better mathematics students. Media can help students get there quickly. Multimedia is the exciting combination of computer hardware and software that allows you to integrate video, animation, audio, graphics and test resources to develop effective presentations on an affordable desktop computer (Arkün & Akkoyunlu, 2008). *Multimedia* simply means "multiple media" or "a combination of media." The media can be still pictures, sound.

motion video, animation, and/or text items combined in a product whose purpose is to communicate information. Multimedia is characterized by the presence of text, pictures, sound, animation and video; some or all of which are organized into some coherent programme (Oshinaike & Adekunmisi, 2011). Multimedia enables learning through exploration, discovery, and experience. Technology does not necessarily drive education. That role belongs to the learning needs of students. With multimedia, the process of learning can become more goal oriented, more participatory, flexible in time and space, unaffected by distances and tailored to individual learning styles, and increase collaboration between teachers and students. Multimedia enables learning to become fun and friendly, without fear of inadequacies or failure. As such multimedia can be defined as an integration of multiple media elements (audio, video, graphics, text, animation and others) into one synergetic and symbiotic whole that results in more benefits for the end user than any one of the media element can provide individually.

Statement of the Problem

A better future for countries depend on the quality of the training they provide for their young individuals with and on the rich learning environments they establish for these individuals (Oshinaike & Adekunmisi, 2011). The paradigm shift from a lecturer-centred to the use of multimedia instruction approaches has been widely advocated throughout the world. Numerous research studies have shown that the use of multimedia learning-based teaching methods are more effective than traditional methods in improving student academic achievement, performance, interest and retention (Arkün, & Akkoyunlu 2008; Ogochukwu, 2010; Oshinaike & Adekunmisi, 2011; Aloraini, 2012). The power of multimedia lies in the fact that it is multi-sensory, stimulating many senses of the audience. It is also interactive, enabling the users of the application to control the content and flow of information. While a lecture can be extremely informative, a lecture that integrates pictures or video images can help an individual learn and retain information much more effectively. Hence the need to enhance the use of multimedia instruction in teaching and learning technology education courses in higher institutions in Niger state,

Research Questions

The following research questions guided the study

1. What are the multimedia instructional facilities/equipment needed for teaching and learning of technology education courses in higher institutions in Niger state?
2. What are skills required in the utilization of multimedia instructional packages for teaching and learning of technology education courses in higher institutions in Niger state?
3. What are ways to enhance the use of multi-media instruction for effective teaching and learning of technology education courses in higher institutions in Niger state?

Hypotheses

The following null hypotheses guided the study and were tested at .05 level of significance:

H₀₁: There is no significant difference between the mean responses of technology education lecturers and educational technology lecturers on the multi-media instructional facilities/equipment needed for teaching and learning of technology education courses in higher institutions in Niger state?

H₀₂: There is no significant difference between the mean responses of technology education lecturers and educational technology lecturers on skills required in the utilization of multimedia instructional packages for teaching and learning of technology education courses in higher institutions in Niger state ($P < .05$).

H₀₃: There is no significant difference between the mean responses of technology education lecturers and educational technology lecturers on ways to enhance the use of multi-media instruction for effective teaching and learning of technology education courses in higher institutions in Niger state ($P < .05$).

Research Methodology

The study adopted descriptive survey design. Purpose of descriptive survey research design is for researchers to describe the attitudes, opinions, behaviours, or characteristics of the population based on data collected from a sample or a population. The study is carried out in two higher institutions in Niger state which offers technology education programme, The population of the study was 70, which consist of 49 technology education lecturers and 21 educational technology lecturers in Federal University of Technology and Niger State College of Education Minna. Sampling was not done since the population is not too large.

All sections of the questionnaire were structured so that respondents will express their opinion on five point rating scale in Table 1. Out of seventy (70) numbers of questionnaires administered to the respondents fifty seven (57) were returned representing eighty one point four percent (81.4%) returned rate. The data collected for the study was organized and analyzed on the basis of research questions and hypotheses. Statistical Package for Social Sciences (SPSS version 19) was used for analysis. The decisions for the research questions were based on the mean score interpreted relative to the concept of real lower and upper limits of numbers as shown in Table 1 The standard deviation was used to decide on the closeness or otherwise of the respondents to the mean in their responses. Any item with standard deviation of less than 2.00 indicated that the respondents were not too far from the mean or from one another in their responses and any item having standard deviation equal or above the stated value signified that respondents were too far from the mean. Decisions on the hypotheses were based on comparing the significant value with ($P < .05$) level of significance. Where the significant value is less than ($P < .05$), it was considered rejected, while equal or greater than ($P < .05$) level of significant, the hypothesis is upheld.

Table 1. Five Point Scale

S/N	RQ 1. Scale	RQ 2. Scale	RQ 3. Scale	Point	Rating
1	Very Highly Needed	Very High Required	Strongly Agreed	4	-
2	Highly Needed	High Required	Agreed	3	2.50 – 3.49
3	Somehow Needed	Less Required	Disagreed	2	1.50 – 2.49
4	Not Needed	Not Required	Strongly Disagreed	1	0.50 – 1.49
5	No Opinion	No Opinion	No Opinion	0	0.00 – 0.49

Research Question 1

What are the multi-media instructional facilities/equipment needed for teaching and learning of technology education courses in higher institutions in Niger state?

S/NO	ITEM				SD	REMARK
		1	2	t		
1	Computer hardware	3.67	3.72	3.70	0.87	VHN
2	Computer Software	3.47	3.67	3.57	0.58	VHN
3	Televisions	3.71	3.62	3.67	0.63	VHN
4	Pictures	3.82	3.53	3.68	0.72	VHN
5	Public Address Systems	2.98	3.54	3.26	0.98	HN
6	Overhead Projectors	3.52	3.55	3.54	1.23	VHN
7	Opaque Projectors	3.31	2.98	3.15	1.34	HN
8	Slides	2.62	2.45	2.54	0.98	HN
9	Video	3.73	3.68	3.71	0.71	VHN
10	Cassettes	3.41	3.43	3.42	0.89	HN
11	Audio Tapes	3.47	3.62	3.55	0.65	VHN
12	Scanner	2.82	2.54	2.68	1.08	HN
13	Flips	2.92	3.31	3.12	1.54	HN
14	Stream Chart	2.43	2.91	2.67	0.78	HN
15	Internet connectivity	3.72	3.84	3.78	0.45	VHN
16	Electrical Power supply	3.79	3.54	3.67	0.57	VHN
17	Standby Generator	3.88	3.43	3.66	0.61	VHN
18	Printers	3.32	3.42	3.37	1.17	HN
	Grand Mean	3.37	3.38	3.37	0.87	

Keys:

\bar{X}_1 = Mean of Technology Education Lecturers; \bar{X}_2 = Mean of Education Technology Lecturers;
 \bar{X}_t = Average Mean; SD = Standard Deviation of Technology Education Lecturers and Education
 Technology Lecturers; VHN = Very Highly Needed and HN = Highly Needed

Analysis of mean responses of the three groups of respondents reveals that 10 out of the 18 items under this sub-heading are adjudged as very highly needed with a mean rating ranging from 3.54 – 3.78. The remaining 8 items adjudged to be highly needed. The 18 items had their standard deviation ranging from 0.45 to 1.54 which is less than 1.96, showing that the respondents were not too far from the mean and were close to one another in their responses. The closeness of the responses adds value to the reliability of the mean.

Research Question 2

What are skills required in the utilization of multimedia instructional packages for teaching and learning of technology education courses in higher institutions in Niger state?

S/N	ITEMS	\bar{X}_1	\bar{X}_2	\bar{X}_t	SD	RMK
1	Installing a computer software	3.44	3.74	3.59	0.98	VHR
2	Updating a computer software	3.52	3.64	3.58	1.10	VHR
3	Troubleshooting a computer software	3.76	3.51	3.64	1.03	VHR
4	Ability to develop programmes/software	3.54	3.67	3.61	0.86	VHR
5	Ability to design graphic	2.98	3.12	3.05	0.67	HR
6	Ability to carry out internal testing and graphics	3.65	3.48	3.57	0.98	VHR
7	Zoom in and out the computer programme	3.73	3.52	3.63	0.78	VHR
8	Ability to Project using projector	3.42	3.46	3.44	0.69	HR
9	Ability to create animations (3-D or 2-D, complex or simple).	3.74	3.64	3.69	0.97	VHR
10	Maintaining computer packages user interface	3.45	3.79	3.62	0.68	VHR
11	Multi-tasking while using computer	3.61	3.78	3.70	0.75	VHR
12	Computer networking skills	3.32	3.24	3.28	0.68	HR
13	Adequate knowledge of the computer packages tools	3.64	3.67	3.66	1.01	VHR
14	Surfing the web for relevant materials	3.50	3.56	3.53	0.65	VHR
15	Installing compatible operating system for the computer	3.75	3.68	3.72	0.73	VHR
16	Ability to scan and optimise images;	3.21	3.14	3.18	0.60	HR
17	Ability to retrieve pre-existing task when needed	3.42	3.25	3.34	0.59	HR
18	Basic Database management skills	2.44	2.83	2.64	0.70	HR
	Grand Mean	3.45	3.48	3.47	0.80	

Keys; VHR = Very Highly Required; HR = Highly Required

The Table 3 reveals that 12 out of the 18 items under this sub-heading are adjudged as very highly required with a mean rating ranging from 3.53 – 3.72, while 6 items were rated highly required. The 18 items had their standard deviation ranging from 0.59 to 1.10 which is less than 1.96; this indicated that the respondents were close to one another in their responses, not too far from the mean. The closeness of the responses adds value to the reliability of the mean.

Research Question 3

What are ways to enhance the use of multimedia instruction for effective teaching and learning of technology education courses in higher institutions in Niger state?

S/N	ITEMS	\bar{X}_1	\bar{X}_2	\bar{X}_t	SD	RMK
1	Provision of adequate equipment/facilities for production and utilization of multi-media instructional packages	3.56	3.87	3.72	1.02	SA
2	Training and re-training of lecturers on production and utilization of multi-media	3.77	3.56	3.67	0.57	SA
3	Constant electrical power supply in institutions	3.52	3.88	3.70	0.99	SA
4	Reduction of tariff on ICT equipment/facilities	3.76	3.64	3.70	0.76	SA
5	Adequate security for multi-media equipment/ facilities	3.70	3.80	3.75	1.11	SA
6	Provision of adequate internet connectivity to institution.	3.55	3.51	3.53	0.87	SA
7	Employment of adequate, competent and experience ICT technical staff	3.57	3.68	3.63	0.67	SA
8	Incorporation of ICT in curriculum	3.62	3.45	3.54	0.89	A
9	Adequate motivation of staff towards the usage of multi-media	3.69	3.54	3.63	0.90	SA

10	Reduction of workload for staff	3.74	3.85	3.80	0.87	SA
11	Employment of quality control and evaluation	3.56	3.80	3.68	0.68	SA
12	Good documentation of the multi-media packages	3.44	3.59	3.52	0.97	SA
Grand Mean		3.61	3.68	3.65	0.86	

Table 4 revealed the similarities and differences in respondents view. The respondents strongly agreed with all items except item 8 with the mean rating ranging from 3.52 to 3.80. The 12 items had their standard deviation ranging from 0.57 to 1.11 which is less than 1.96, showing that the respondents were not too far from the mean and were close to one another in their responses. The closeness of the responses adds value to the reliability of the mean.

Hypothesis 1

Table 5: Z-test for the Mean Responses of Respondents on the Multimedia Instructional Facilities/Equipment needed for Teaching and Learning of Technology Education Courses in Higher Institutions in Niger state.

Respondent	Mean	S.D	N	df	Z	Sig (2 tailed)
Technology Education Lecturer	3.37	0.82	42	55	-2.00	- 0.037
Education Technology Lecturer	3.38	0.92	15			

The result of analysis presented in Table 5 indicated that there is no significant difference in the mean scores of respondents $Z(55) = -2.00, P = .037$.

Hypothesis 2

Table 6: Z-test for the Mean Responses of Respondents on Skills Required in the Utilization of Multimedia Instructional Packages for Teaching and Learning of Technology Education Courses in Higher Institutions in Niger state.

Respondent	Mean	S.D	N	df	Z	Sig (2 tailed)
Technology Education Lecturer	3.45	0.79	42	55	-2.00	0.148
Education Technology Lecturer	3.48	0.63	15			

The result of analysis presented in Table 6 indicated that there is no significant difference in the mean scores of respondents $Z(55) = -2.00, P = .148$.

Hypothesis 3

Table 7: Z-test for the Mean Responses of Respondents on ways to enhance the use of multimedia instruction for effective teaching and learning of technology education courses in higher institutions in Niger state

Respondent	Mean	S.D	N	df	Z	Sig (2 tailed)
Technology Education Lecturers	3.61	0.96	42	55	-2.00	0.285
Education Technology Lecturers	3.68	0.76	15			

Table 7 indicated that there is no significant difference in the mean scores of respondents $Z(55) = -2.00, P = .0285$ on ways to enhance the use of multi-media instruction for effective teaching and learning of technology education courses in higher institutions in Niger state

Summary of the Findings

Below are the findings arise from the study.

The multimedia instructional facilities/equipment needed for teaching and learning of technology education programme in higher institutions in Niger state include:

1. Internet connectivity
2. Television
3. Computer Software
4. Computer hardware
5. Overhead Projectors
6. Electrical Power supply

Skills required in the utilization of multimedia instructional packages for teaching and learning of technology education programme in higher institutions in Niger state are:

1. Ability to develop programmes/software
2. Ability to design graphic
3. Ability to create animations (3-D or 2-D, complex or simple).
4. Maintaining computer packages user interface
5. Computer networking skills

Ways to enhance the use of multi-media instruction for effective teaching and learning of technology education programme in higher institutions in Niger state include:

1. Provision of adequate equipment/facilities for production and utilization of multi-media instructional packages
2. Training and re-training of lecturers on production and utilization of multi-media
3. Constant electrical power supply in institutions
4. Adequate security for multi-media equipment/facilities
5. Provision of adequate internet connectivity to institution.

Discussion of Findings

The findings revealed that teaching of technology education courses in higher institutions can be enhanced through the use of multimedia instruction equipment/facilities such as television, computer, internet connectivity and others become necessary. Aloraini, (2012) emphasized that for effective use of multimedia instruction in teaching, internet facilities, television and computers need to be available and also should be adequate in number. The nonhuman is the equipment required for production. These are personal computer, scanner, video camera, digital camera, multimedia projector, and authoring tools. (Nation Open University of Nigeria, 2006)

Skills required in the utilization of multimedia instructional packages for teaching and learning of technology education programme in higher institutions among others are ability to develop programmes/software, ability to design graphic, ability to create animations (3-D or 2-D, complex or simple), maintaining computer packages user interface and computer networking skills. This is supported by the work carried out by Ogochukwu, (2010), which he said acquisition and development of multimedia instructional skills is important in the utilization of the package in teaching. The findings revealed that to enhance the use of multimedia instructions in higher institutions, there is need for provision of adequate equipment/facilities for production and utilization of multimedia instructional package and provision of adequate internet connectivity to institution. The findings are supported by the work of Oshinaike & Adekunmisi, (2011), which they recommended that the federal and state government should see ICT integration effort at the higher institutions as an embracing project to development in education and should support by allocating and releasing adequate funds to invest in massive Internet connectivity, as well as purchase and install ICT infrastructure. Also, the institutions must aim to ensure availability, accessibility and reliability of ICT facilities such that every lecture room and staff offices have computers linked to Internet and has equipment appropriate for accessing a range of electronic resources (Arkün, & Akkoyunlu, (2008). Oshinaike & Adekunmisi, (2011) further recommended that the government can also help by subsidizing or reducing the tariffs on importation of ICT facilities so that lecturers and others can afford the purchase of these ICT facilities and accessories since the price will come down. Training and re-training in the use of multimedia facilities and production of images are very essential, it facilitate adequate multimedia usage. ICT training should be given to lecturers and other members of staff in the university on integration of technology in instruction.

Conclusion

Multimedia is one of the best educational techniques because it addresses more than one sense simultaneously, as it addresses the senses of sight & hearing. Lecture can be extremely informative, a lecture that integrates pictures or video images can help an individual learn and retain information more effectively. It is therefore necessary to make available multimedia facilities/equipment such as computer hardware and software, television and others. Acquisition of required skills in production of packages and to facilitate it usage is very important.

Recommendations

Based on the findings of the study, it is recommended that;

1. School administration should provide adequate hardware and software and other multimedia facilities/equipment in order to fully implement the use of multimedia instruction packages in schools.
2. School administration should provide periodic training and re-training of lecturers on acquisition computer skills to keep them up-to-date in the vast technological world of today and to enhance their ability in the production of graphics.
3. Internet connectivity should be made available in classrooms, offices, laboratories, workshops and hostels of higher institutions to facilitate the usage of multimedia in teaching of technology education courses.
4. Adequate usage of multimedia instruction can be made possible, when there is adequate power supply to the institutions. Therefore constant electric power supply should be made available in the institutions and this can be done through the availability of standby generator.

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