VOL. 05 NO. 8,
AUGUST, 2024
E-ISSN 3026-8893
P-ISSN 3027-1061



African Scholar Publications & Research International
www.africanscholarpub.com

Journal of Education Research and Library Practice (JERLP)

Computer Multimedia: Instrument for Teaching and Learning in Tertiary Institutions in Bauchi State, Nigeria

Ahmed Mohammed Tijjani; David, Caleb Ifeanyichukwu; Muhammad Turaki Aliyu; & Fatima Maikudi Abubakar

Department of Computer Science, School of Communication & Information Sciences, A.D Rufa'i College of Education, Legal and General Studies Misau, Bauchi State Nigeria.
Corresponding Author: *ahmadtijjani4012@gmail.com*

Abstract

Computer Multimedia as instrument for teaching and learning can't be over emphasized because of its advantageous effects in our educational sector more especially in Tertiary Institutions in Bauchi State, Nigeria. The selection of the method to be used by a teacher or Course lecturer depends on his skills and the amount of knowledge he/she wants to impart. Computer multimedia is a computer system that can create, import, integrate, store, retrieve, edit, and delete two or more types of media materials in digital form, such as audio, image, full-motion video, and text information. And multimedia is a combination of text, graphic, animation, audio, and video which are everything we can see and hear in our daily life. In this paper, appeal was made on existing Literatures sources which are mostly journals, research articles and sampled Tertiary Institutions were selected in Bauchi State were questionnaire were served and responses was collected for analysis. These include A.D Rufa'i COELEGS Misau, Bauchi State University (Law Faculty, Misau Campus), and COE Azare Bauchi State. The paper surveys the multimedia applications for educational purposes. There are six main elements in multimedia applications for educational purposes which are texts, images, audios, videos, animations and user control. Besides that, this paper explores some advantages and disadvantages of multimedia applications in education. There also

have few characteristics in education which are screen design, interaction and feedback, navigation, video and audio elements on the development in education. In education, multimedia applications are used as a source of information to deliver learning resources for students. Multimedia applications are also used to improve the learning process and increase the interaction between Students and Teachers or Lecturers. Teachers or Lecturers can make the lesson more interesting by using the multimedia applications. A multimedia application can highlight certain important points rather than writing on the white board. There is no doubt that the role of multimedia applications for educational purposes. As part of the way forward the paper recommends that our Tertiary Institutions in Bauchi State should embrace Computer Multimedia in her educational system, which will enable teachers and lecturer's carryout effective teaching.

Keywords: Computer Multimedia, Teaching, Learning, Multimedia Applications, Educational Purposes, and ICT.

Introduction

The development of electronic multimedia, like as computers, was inevitable when the barter system gave way to the monetary economy and the necessity for numbers, computing, and record-keeping emerged. Combining various media types such as, text (alphabetic or numeric), symbols, photographs, photos, music, video, and animations with technology is known as multimedia. The goal is to improve comprehension and memorization (Guan et al., 2018). In various regions of the world, numbers were in use as early as 300 B.C. A computer system can receive raw data as input through an input device, store and process it, and then output the processed data or information on an output device, also referred to as an output. Some people have consistently offered various remedies in response to problems. Through the use of visualization technology, it enhances spoken teaching by providing static and dynamic pictures for improved expression and comprehension (Alemdag and Cagiltay, 2018; Chen and Liu, 2008). Many Tertiary Institutions have chosen to pursue the dynamic educational options by using computer multimedia in teaching and learning, Schools and Tertiary Institutions in Bauchi State Nigeria will not be neglected. In this age of Information and Communication Technology (ICT) where the world seems to be reduced to a global hamlet, no State desire to be mapped out for the relevant hamlet. Computer multimedia is therefore an indispensable tool in teaching and learning.Multimedia technology refers to the hardware and software required to create and execute

multimedia applications (Kapi et al., 2017). People may transmit information or ideas with digital and print materials thanks to the features of multimedia technology, such as integration, diversity, and interactivity. In this context, the terms "digital" and "print" refer to multimedia-based tools or programs that are used to provide information to individuals so they may better grasp concepts (M.D. Abdulrahaman et al., 2020).

In the context of this paper, Computer Multimedia focused on the enhancement of teaching and learning in our educational system to enable easy presentation of Subjects or Courses that seems to be hard to the student. In that case, knowledge and skills acquisition are necessary as a fundamental of ICT. Teaching, science educational Courses or Subjects in general and Computer Science in particular today, demand for teachers capable of teaching the new technology and helping students interpret and repackage information and provide information. Rich environment, for communication to use ICT in the learning environment, there is need for students to have access to multimedia like computer, fax machine, telephone and electronic mail etc. Multimedia applications had greatly influenced the education in many ways.

It helps Teachers or Lecturers to prepare study materials for students in a more clearly and comprehensive way such as demonstrate and visualize the study material in a multimedia presentation (Milkova, 2012). Multimedia applications can also be used as a source of information. Multimedia applications can be developed to enhance the learning process and increase the interaction between Students and Lecturers. The use of Computer to facilitate teaching and learning process within the formal learning and teaching situation will eventually enhance the acceptance of this versatile technology (Computer Multimedia) in Bauchi State, Nigeria which are normally dominated by the indigenous technology.

Assuming all Teachers and Lecturers will be instructed to make use of ICT to support their teaching and learning environment, few will feel uncomfortable to teach using an ICT suite rather than their own homegrown method. Many will feel that they could do a better job if the resource were more accessible for the lesson and the scheme of work. Being able to use ICT confidentially at home and as the teacher in charge of the lesson are two different things. Apart from the general classroom management issues, there can also be disconcerting technical differences.

Theoretical Review

In education, Multimedia Application is used to provide computer-based training courses and reference books such as encyclopedia. A computer-based training courses lets the students go through a series of presentation, text about a particular topic in various information format (Singh, 2007). Multimedia Applications are used by

Teachers and Lecturers to convey information such as lecture slides, assessment materials and others learning resources. It can also use by students to learn new skills and knowledge without Lecturer's guidance.

Huang et al. (2017) explored the use of multimedia-based teaching materials that include three view diagrams (3D) and tangible 3D materials to teach 3D modelling course. This was aimed at determining the influence of multimedia technology in meta-cognitive behaviour of students. The authors employed lag sequential analysis as well as interview methods to examine the pattern transformation of students' meta-cognitive behaviour while solving problematic tasks.

According to Steinmetz and Nahrstedt (1995), "Multimedia Applications are moving from a single PC environment to either a multi-user environment or to a personalized user environment." The rapid innovation and development in information and communication technologies has increased the used of multimedia applications in our daily life and brought the changes to computing, entertainment and education.

According to M.D. Abdulrahaman. *et al.,* (2020). Access to quality education is still a major bottleneck in developing countries. Efforts at opening the access to a large majority of citizens in developing nations have explored different strategies including the use of multimedia technology. Apart from text and images, existing tools were found to have multimedia components such as audio, video, animation and 3-D. The study concluded that the majority of the multimedia solutions deployed for teaching and learning target the solution to the pedagogical content of the subject of interest and the user audience of the solution while the success of the different multimedia tools that have been used on the various target groups and subjects can be attributed to the technologies and components embedded in their development.

Zhang, F., 2012. created an online teaching and learning resource platform with interactive and integrated features. The platform was created with Macromedia Flash version 8.0, a form of Computer Aided Drawing (CAD) software that is very easy to use. In an attempt to test student's professional cognition and operational skill cognition as well as learning satisfaction during learning phase, an experimentation technique that utilizes a non-equivalent pre-test and post-test control group was adopted. The evaluation revealed no significant difference between the groups in terms of professional cognition and operation skill cognition. However, it was noted that a significant difference exists in learning satisfaction, which shows a greater satisfaction in the coursework with multimedia Flash compare to that of the traditional learning method.

The theoretical review of this paper captured the theory of Cognitive Flexibility (Spiro, et al, 1992), emphasized by Kirkpatrick's four levels of evaluation (Kirkpatrick, 1994). Cognitive Flexibility means the ability to spontaneously restructure one's knowledge in many ways, in adaptive response to radically changing situational demands.

Kirkpatrick emphasizes reactions, learning, transfer and results. Level one is reactions and just as the word implies, learning at this level measures how participants in a training program react to it. It attempts to answer questions regarding the participants' perceptions - did they like it? was the material relevant to their work? In addition, the participants' reactions have important consequences for learning (level two), although a positive reaction does not guarantee learning; a negative reaction almost certainly reduces its possibility (Winfrey, 1999).

At level two, teaching moves beyond learner satisfaction and attempts to assess the extent to which students have advanced in skills, knowledge, and attitude to determine the amount of learning that has occurred. Level three is transfer; this level looks at the transfer that has occurred in learners' behavior due to the teaching program. Teaching at this level attempts to answer the question - are the newly acquired skills, knowledge, or attitude ready to be used in the everyday environment of the learner?

According to Roblyer (2004), technology integration skills (computer) can't be learned by sitting in the classroom and listening to an instructor or watching demonstration. Students must have an opportunity to navigate through a program and complete a step to create a new product.

Liliana Ciascai, & Iuliana Marchis (2008), conducted an investigation were analyzed 105 primary school programs and 157 secondary school programs for 39 disciplines, according to their study multimedia is present in our everyday life, thus its management is considered as a necessity by the specialists. The relation of multimedia with education is very complex: we speak about education with multimedia and multimedia education. In this paper we propose to characterize partially the above-mentioned relations, analyzing the openness of primary and secondary school curricula for use of multimedia in the learning process. This openness is the first step toward multimedia education.

The Theory largely concerns with transfer of knowledge and skills beyond their initial learning situation. Skills transfer can be described as students' desire to use the knowledge and skills mastered in the training program on the job (Noe & Schmitt, 1986 in Yamnill & McLean, 2001). Behavioral change would likely occur for students who learn the material presented in training and desire to apply that new knowledge or skills to work activities. Two different types of transfer have been proposed, near transfer and far transfer. Near transfer is applying the learnt information or skills in a new environment that is very like the original one.

Accessibility of ICT Resources and Students Effective Learning

Integration of ICT in Schools would call for a whole Institution to be networked to ensure access to multimedia and learning rich resources via the school's Intranet and the Internet wherever students and teachers are, in or out of the school. The computer

labs and classroom computers need to be sufficient in number to allow ready access by students and staff in most subjects across the school. A wide range of peripheral and remote working devices, including video-conferencing, is provided and integrated into the curriculum. Large and small group presentation facilities are readily available (school net Africa, 2004). Despite the above desired situation, most schools and Tertiary Institutions in Bauchi State, Nigeria face barriers to effective integration of ICT in the teaching and learning process; limited infrastructure in terms of satisfactory physical conditions of laboratories and the subsequent accessibility of the resources (ICT) to the learners.

However, it is easy to see that multimedia has tremendous potential to enhance the vividness with which information can be presented and ease to which it can be accessed, the main barriers to learning are not generally that appropriate; information is difficult to access or badly presented. The problem has more to do with that information (Shank & Kass, 1996). In addition, physical limitations of the classroom including size and location of desks, often limit choices of room arrangement and do not provide the space that is necessary to add pods of computers to be used as technology Centers.

Some authors like Chenyang, *et al.,* (2019) argued that Computer Multimedia reduces the effect of students' classroom lectures because the stimulus intensity is not enough. He added that there is lack of emotional communication, ignore the leading role of teachers and may lead to fatigue.

Methodology

In this paper, appeal was made on existing Literatures sources which are mostly journals, research articles and sampled Tertiary Institutions were selected in Bauchi State, questionnaire were served and responses was collected for analysis. These include A. D Rufa'i CLIS Misau, Bauchi State University (Law Faculty, Misau Campus), and COE Azare Bauchi State, Nigeria.

The study population was big therefore, Random sampling was used to come up with a sampled size which was representative of the study population. Stratified sampling was used to identify the stratum in the population, Students, Lecturers and Administrators were used as relevant stratum and their actual representation in the population. Sufficient number of subjects from each group. Frequency and percentage table will be used as statistical tools to analyze the result obtained.

Result Presentation and Analysis

A sample of fifteen (15) respondents was targeted with the guide of a Table for sample selection Tables of sample. The categories and size of the respondents that took part in the survey are herein presented in the Table below.

S/N	Sample	Number
1.	Students	9
2.	Teachers	1
3.	Lecturers	4
4.	Admin(s)	1
	Total	**15**

Figure 1: Table of categories and size of respondents

From the responded questionnaire the below were deduced and analyzed.
Item 6: The availability of ICT resources in Tertiary Institution in Bauchi State

	Availability	Fairly Available	Not Available
Frequency	8	2	5
Percentage	0.08	0.02	0.05

Item 7: The adequacy of ICT resources in Tertiary Institution in Bauchi State

	Inadequate	Fairly Adequate	Adequate
Frequency	5	5	5
Percentage	0.05	0.05	0.05

Item 8: The accessibility of ICT resources in Tertiary Institution in Bauchi State

	Never at all	Not sure	Sometimes	Always
Frequency	1	1	11	2
Percentage	0.01	0.01	0.11	0.02

Item 9: Knowledge and skills in the use of ICT resources in Tertiary Institution in Bauchi State

	Very poor	Poor	Fair	Good	Very Good
Frequency	1	1	2	8	3
Percentage	0.01	0.01	0.02	0.08	0.03

Discussion of Results

It is observed that there exist several multimedia tools in education, but the proliferation of the tools is attributed to the evolvement of technologies over the years and the continuous teachers' efforts to improving knowledge delivery with respect to the subject areas and target audience (M.D. Abdulrahaman. *et al.,* 2020). From the above Figure 1titled “Table of categories and size of respondents”, the respondents were categorized into four categories such as Students, Teachers, Lecturers, and Admins (the people under administrative sections). The points from the respondents

were itemized based on the questionnaire distributed although, the inputs from the targeted audience were very poor. Item six (6), that captured the availability of ICT resources in Tertiary Institution in Bauchi State with the percentage of 0.08 over 15%, shows that there are available in major in Tertiary Institution in Bauchi State.

The Item eight (8), that talks about the accessibility of ICT resources in Tertiary Institution in Bauchi State, shows that students are not always accessing the ICT resources but sometimes which proper measures should be taken, while Item seven (7) describes the adequacy of ICT resources in Tertiary Institution in Bauchi State, which is not highly adequate. The Item nine (9) talks about the knowledge and skills in the use of ICT resources in Tertiary Institution in Bauchi State, the returned responded questionnaire shows that the knowledge and skills in the use of ICT resources in Tertiary Institution in Bauchi State is good but not very good, which the government have to look into.

Advantages of Using Educational Multimedia Applications

The growth in use of multimedia applications for educational purposes has accelerated in recent years, and looks set for continued expansion in the future. The multimedia applications play an undeniable role in education. Multimedia applications have many advantages that allow teachers and lecturers to provide other advice which tailored to particular group of learners' needs (Cairncross and Mannion, 2001).

1. Teachers or lecturers discover the ways to boost student's interest and motivate them by using educational multimedia applications.
2. Students can also actively be involved in the learning process by using multimedia applications such as CD-ROM based textbook, tutorials and laboratory experiments (Yadav, 2006).
3. Multimedia applications increase the learning effectiveness and are more attractive than traditional-based learning methods. This new learning environment definitely influence the way of Teachers or Lecturers teach and the way Students learn.
4. Teachers or Lecturers continually search for more effective ways to attract their students during learning as well as to increase student learning outcomes.
5. People learn better from words and pictures than from words alone. Therefore, educational multimedia applications use a combination of multimedia elements to present and emphasize particular points only, thus it is more effective because the students are easier to put attention on it rather than on static printed learning materials.
6. Students often split their attention when they are forced to focus information that is far apart, or it is presented at two separate points at the same time.

Therefore, when the related content is presented in words and picture at the same time, the learning outcome is more effective.

Research found that students will participate in the lesson more actively when Teachers or Lecturers integrates multimedia element in learning process because they will pay more attention as the lesson becomes more interesting (Fatimah Puteh & Siti Shuhaida, 2009).

Disadvantages of Using Educational Multimedia Applications

Multimedia applications for educational purposes that delivered the learning materials via videos or images need Computers, Projectors and other electronic devices, so the expenses for these applications can be very expensive.

1. Normally multimedia applications for educational purposes are more expensive than printed text book because it requires expensive hardware.
2. Multimedia applications, some are not so easy for configuration and requires special hardware to run it.
3. When lecturer uses educational multimedia application, some will shift his role from instructor to facilitator.

Characteristics of Educational Multimedia Applications

There are few characteristics of multimedia applications in education which are screen design, interaction and feedback, navigation, video and audio elements on the development in education.

Firstly, screen design is use to coordinate text and graphic elements in order to present sequenced content to facilitate learning and enhance student's understanding. Each instruction that displays on screen in a multimedia application must provide effective instruction and navigation tools to the students. Screen design also use to boost the interest of the students and convey the required information to them. The second characteristic is interaction and feedback, it allows student to interact and control the flow of information and stage of learning with the multimedia application. Interaction and feedback also enable student active participant in the instruction learning process and provide feedback immediately following a student response.

Third characteristic of multimedia applications for educational purposes is navigation. Navigation feature can enhance learning outcome and make an interactive multimedia application easy to use by the students.

Navigation provides students some control over the events and allows them to jump into new sections or revisit the information from earlier screen.

Lastly, video and audio elements on the development in education have advantages to present the information to those students who have poor reading and learning skills.

Students are easier to understand the lessons which use audio and video to convey the information rather than static learning materials. When audio and video is used to support text, it can provide an opportunity for the students to pause and repeat the sound. (Stemler, 1997).

Conclusion

Computer Multimedia is an excellent tool for educational purposes. It can improve the effectiveness of learning outcome by delivering the information to the students. Multimedia applications can be used to deliver information in an interesting way by combining the elements of texts, images, audios, videos, animations and user control. Multimedia applications have a lot of advantages for the education purposes which can help students have further understanding on certain information or topics. Screen design, interaction and feedback, navigation, video and audio elements are the characteristic of multimedia applications.

There is no doubt that the multimedia applications can be used as a tool to assist Teachers and Lecturers to achieve educational effectiveness. However, multimedia applications for educational purposes have its disadvantages too. Developing a good multimedia application has high cost that involves time and effort of the developer. There are few characteristics that a developer uses to improve the effectiveness of educational multimedia applications which attract student's attention, help students organize the information and facilitate lesson navigation and integrate all the information into knowledge. From the survey, multimedia infrastructure is poorly developed, unevenly distributed and inadequate. However, some multimedia resources like Computer Lab, Projectors, Monitor and Television sets were considered to be fairly available. Though not fully adequate, but recognizes the need for multimedia resources in its academic endeavors and as such there are already something to build on. The biggest challenge affecting easy access to multimedia facilities remains the limited number of multimedia resources which does not match with the ever-increasing student population. But there was at least something in place to build on though still was limited to Computers. To a large extent, students training in multimedia was mainly limited to Microsoft Office suits but not skill acquisition that led to multimedia skill transfer to use multimedia both for learning and in other settings.

Recommendations

i. Bauchi State Government, should provide supporting facilities like Smart boards for proper deployment of multimedia applications in its higher Institutions.

ii. Academic staff should be trained on how to use multimedia applications in supporting the teaching and learning process.

iii. Training in multimedia skills should not be limited to Microsoft Office suits; they should go ahead to integrate other programs and software packages.

iv. There is need to provide and maintain Internet availability to enable Internet connectivity of the computer systems; which will then liberalize accessibility of Internet and e-mail in the Institutions in form of establishment of multimedia resource Centers where all software can be accessed, Students' packages and all versions of technology.

v. There is need to invest more on Computers and related technologies as means of not only solving accessibility problem but improving the facilities especially Computers in the classroom and Computer Laboratories including more infrastructures: Printers, Joysticks, Digital Electronic Board, Micro-phone, Amplifiers, Digital Recorder, Projectors, etc. should be put in place for more practice and utilization.

Declaration of Competing Interest

The authors declare that there are no conflicts of interest.

References

Alemdag, E., Cagiltay, K., 2018. A systematic review of eye tracking research on multimedia learning. Comput. Educ. 125, 413–428, 2018

Cairncross, S., & Mannion, M. (2001). Interactive Multimedia and Learning: Realizing the Benefits. 156-164.

Chenyang, L., Bo, Z., Ye, W., Shuai, W., Haihang, X., Dai, J., et al. (2019). The Application of Multimedia Courseware in Teaching. 2019 3rd International Conference on Education Technology and Economic Management.

Fatimah Puteh & Siti Shuhaida Shukor. (2009). The Integration of Multimedia Elements In Classroom Teaching Among TESL Teacher-Trainees. 1-6.

Guan, N., Song, J., Li, D., (2018). On the advantages of computer multimedia-aided English teaching. Procedia Comput. Sci. 131, 727–732, 2018.

Kapi, A.Y., Osman, N., Ramli, R.Z., Taib, J.M., 2017. Multimedia education tools for effective teaching and learning. J. Telecommun. Electron. Comput. Eng. 9 (2-8), 143–146

Liliana Ciascai, & Iuliana Marchis (2008). Multimedia In Primary and Secondary School Curricula in Romania. Acta Didactica Napocensia. Volume 1, number 2, 2008.

M.D. Abdulrahaman. *et al.,* (2020). Multimedia tools in the teaching and learning processes: A systematic review. Heliyon 6 (2020) e05312. Contents lists available at ScienceDirect. journal homepage: www.cell.com/heliyon

Milkova, E. (2012). Multimedia Application – Effective Support of Education.13-21.

Nedeva, V., Dimova, E., & Dineva, S. (2010). Overcome Disadvantages of E-learning for Training English as Foreign Language. 275-281.

Norhayati Abd Mukti, & Siew, P. H. (2004). Malaysian Perspective: Designing Interactive Multimedia Learning Environment for Moral Values Education. 143-152.

Roblyer, M.D. (2004). Integrating Educational Technology into Teaching, 3rd Ed. Upper Saddle River, N.J: Pearson/Merrill/ Prentice Hall.

Singh, V. P. (2007). A Text Book of Multimedia. United Stated: Global Media.

Steinmetz, R., & Nahrstedt, K. (1995). Multimedia: computing, communications, and applications. New York: Prentice Hall.

Stemler, L. K. (1997). Educational Characteristics of Multimedia: A Literature Review. 339-359.

Vaughan, T. (2010). Multimedia Making It Work, 8th Edition. Mc Graw Hill
Yadav, & Vaughan. (2006). Using Multimedia in Education. United Stated: Global Media
Zhang, F., 2012. Significances of multimedia technologies training. Phys. Procedia 33, 2005–2010, 2012.
Zhang, W. (2014). Thinking of Multimedia Courseware and Teaching Innovation on Vocational Colleges. 2nd International Conference on Education Technology and Information System. Francis Academic Press, UK.