INTEGRATING EDUCATIONAL TECHNOLOGY AS A MEANS OF IMPROVING SCIENCE STUDENTS' ACHIEVEMENT THROUGH CLOUD COMPUTING AND POWERPOINT PRESENTATION

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Abstract

This paper focused on transforming students' achievement through cloud computing and PowerPoint Presentation patterns. Basic science students exposed to Text- picture mode were compared with their counterparts exposed to the Text- animation mode of PowerPoint presentation of cloud content. One research question' and one null hypothesis guided the study, A quasi-experimental non-equivalent control group research design involving two intact classes were used. The accessible population comprised of 1359 JSS3 basic science students in the eleven (11) co-educational public secondary schools in Gombe Local Government Area. A sample of eighty (80) students from two co-educational schools was drawn. Multi- stage sampling techniques was used for the study. The instrument for data collection was the Basic Science Achievement Test (BSAT). The (BSAT) with a temporal stability of 0.78 and internal consistency of 0.63 was found to be adequate. The instrument was validated by three experts. The data were analyzed using Mean, Standard Deviation and Analysis of Covariance. The result of the analysis showed that Text-animation group performed better than Text-picture group, though not significant. It was then recommended that teachers should embrace the use of cloud computing and Text-animation mode of PowerPoint presentation in the instructional process.

Training and seminars on how to Design learning content using cloud computing PowerPoint presentation should be conducted for basic science teachers.

Introduction

The yardstick for measuring level of academic achievement is by assessing the academic performance of an individual through test and observation. Students' achievement tests are used to describe student's strength and difficulties at the time the test was given. It is mostly used in determining the relative position or rank of students with respect to their performance in various fields of learning, for instance sciences. Anekwe (2006) defined Science achievement as a test for measurement and comparison of skills among science students. This shows rate of knowledge demonstrated by an individual after learning has taken place. Operationally, Science achievement can be defined as how well a learner accomplishes work in science setting and changes in behavior attended after learning has taken place. Students' poor achievement in basic science has been observed over the years, with special reference to secondary school students in Gombe local government of Gombe state. The results of Basic Education Certificate Examination (BECE) conducted by state Ministry of Education, Gombe in 2014, 2015, and 2016 indicated students' poor achievement and difficulty in crediting Basic science. Specifically, schools in Gombe Local Government Area of Gombe State, in the above mentioned years, 22.5% of students scored credit or above credit grade while about 74.5% had ordinary pass in Basic science; (Examination Development Centre (EDC) Gombe, (2015), The manner in which science subjects are taught by teachers in the classrooms has been highlighted as an important factor affecting students' achievement in science. Udeji (2007) and Udouson (2002) in their studies identified that method of teaching adopted by a teacher affects the level of students' achievement in school.

In line with the above, Ezugwu (2013) noted that effective teaching as a result of the use of appropriate method and instructional media might facilitate learning and make it more meaningful. Effective teaching helps the learner to learn better while poor teaching would naturally lead to poor learning and consequently poor achievement.

Besides the teaching method, instructional media for students to interact with becomes necessary as this will provide a first-hand experience which guarantees learning (Okoye, 2003). As observed by Examination Development Centre (EDC) Gombe, (2015), students' performance in Basic science, BECE was poor. Therefore, the continuous inability of the students to get credit in Basic Science, outcries for the need for transformation and a paradigm shift from the conventional method of teaching to innovative-interactive methods of teaching that is Information Communication and Technology (ICT) based. Example

Computer Assisted Instructions (CAI), Computer Concept Mapping (CCM), Cloud computing, video conferencing and Presentation software among others. This traditional method keeps the students passive in class and invariably leads to poor achievement (Alumona (2012). Supporting the above, Udo and Udosen (2010) stated in their study, that most of our teachers are used to Chalk-talk method of teaching, rendering the student passive learners. The use of this method (talk chalk/ traditional method) contradicts the students-centred-learning-approach recommended by the Federal Ministry of Education (Federal Government of Nigeria, FGN 2004). Meanwhile, interest in the use of modern technology in every discipline is increasing in all nations of the world. Countries strive to produce more and better trained students through the adoption of various educational technological innovative techniques. Educational technologists believe that if educational institutions prepare the students to meet the challenges of the new millennium, they should accommodate educational technology competence to fit in their work places after graduation (Bartsch and Cobern 2003). This therefore calls for teachers or instructors to incorporate educational technology in teaching and learning process, thereby giving the students opportunity to engage actively in the lesson as well as develop technical skills and explore in more details the content taught. This however will increase academic achievement in Basic science, specifically Earth disaster/Ozone layer depletion related topics in the curriculum.

One of the educational technologies that are readily available in the classroom is presentation software. Presentation software allows the teachers and students to generate many different actions including overheads, slides, hand-outs and speakers note, all in single file. By interacting with this type of technology, students play a more active role in their own learning situation. Different types of presentation software exist. Some of them include: Adobe persuasion, Gold Disk Astound, Delta Graph Pro and Microsoft PowerPoint. According to Mcclell in Ramazan (2006) all of these presentation packages are fairly compatible. One of this software that is user-friendly, accessible to teachers and allows arrays of options is PowerPoint by Microsoft.

In this research, Microsoft PowerPoint (full name Microsoft office PowerPoint) will be used because it has advantages over other presentations, being widely used by business people, educators, trainers etc. Apart from being among the most prevalent forms of persuasive technology, Supporters and Critics, generally agree that PowerPoint is easily accessible and saves time for people who, otherwise, would have used other types of visual aids, like hand-draw or mechanically typeset slide, blackboard or overhead projections. Some researches stated that PowerPoint presentation (PPT) enhances instruction, motivates and influences students learning positively (Harrison 1999, Parks 199). Connor and Wong (2004), Bartsch and Cobern (2003), Jonassen et al (2003), Craig and Amermic

(2006) stated that PPT have become the most prevalent and popular form of multimedia in, education, as students prefer it to presentation from transparencies.

Cloud computing PowerPoint Presentation in this study has two modes. These modes may vary from one researcher or teacher to another depending on how the person wants, these include; Basic PowerPoint (text only),text in combination with still picture (text-picture), text with animation (text-animation), text with video (text-video), text with pictures and sound d/voice(text-picture-sound), text with recorded voice(text-voice), text with instructors voice, voice with pictures (voice-picture) etc. These above listed modes are combination of two or three media of interest.

Operationally, this study has two modes of presentation with the following headings: text with picture and text-pictures with animation.

Text- pictures: This mode can be described as PowerPoint presentation slide that has typed words or text and images or pictures on the concept to be taught. The text illustrates or explains the images. It is a mixed approach that contains note, though in a more abbreviated format that can be copied by students during or after the lesson.Text- animation: This is a combination of the above mentioned mode with animation.

It is also a mixed approach where there is text explaining the vital points, pictures for illustrations and animation for visual effect applied to individual items on the slide such as graphics, titles or bullet points. There are two types of animation: Text animation and graphic animation. Text animation involves animating text while graphic animation involves animating graphics. Either type of animation may add interest to the presentation.

However, for more convenient, cheaper, accessible, interactive, availability of instruction, it can be saved in the cloud. Griffith (2015) stated that the cloud is just a metaphor for the internet. He further defined Cloud computing as a means of storing and accessing data and programs over the internet instead from personal computer's hard drive. Cloud computing technology can be adopted in all areas of society especially in business and education. In education, for instance in e-learning, solution based on the cloud promote a new era of learning, in which the lectures and labs are based on cloud platform through virtualization. A variety of knowledge can be made available to teachers and students through cloud-based services and these services can be accessed anytime, anywhere, and on any device like laptop, desk top, tablets, smart phones etc. Latest tools for easy access to cloud are available in Amazon, Microsoft and Google etc. So the users can use free office application without having to purchase, install and maintain these applications on their computer; there are enhanced collaboration possibilities; the data do not get lost, they are stored in the cloud for free use and accessible from any location or from

a range of devices such as mobile phones (Isaila2014).

Isaila (2014) pointed out that cloud computing technology approach is based on the services they offer, their implementation and architecture. He listed the services as follows:

Platform as a Service (PaaS): This provides a range of software for the development of programs.

Software as a Service (SaaS): Here users access cloud software provided by cloud administrators who supervise them
Infrastructure as a Service (laaS): That is the base model in cloud computing.
However, the cloud can be classified according to their deployment model. These deployment models include: public, private, community and hybrid cloud.
Public cloud: This form of cloud infrastructure is shared and accessed by all with application and services delivered through the internet.

Private cloud: This is restricted infrastructure operated by or on behalf of a specified organization, available exclusively to approach users affiliated with that organization; cloud services are delivered through private network.

Community cloud: This is multitenant private cloud infrastructure that supports a specific community, consisting of two or more organizations,

Hybrid cloud: This is combination of two or more of preceding cloud type.
In other for a teacher to save, access and share an instruction with his/her students and the public, the teacher can prepare his or her lesson note, script writing, and instructional material, host them in the cloud and then create a link to websites related to the content taught For the course of this study, the PowerPoint presentation on ozone layer depletion and its effect was prepared and hosted as a public cloud deployment model using http//www. datafilehost.com with the following downloading links: http//www.datafilehost.com/d/deb3753 b, www. datafilehost.com/d/3 b5d6e79, www.datafileho st.com/d/32fe9881, www.datafilehostconVd/297db243,www.datafilehost.com/d/5e67833d, www.datafilehost.eom/d/fod99b9b. Each site is linking to each of the six PowerPoint presentations. Also the teacher provided the students with the following web address discussing the content used for the study, ozone layer and its effect. The web addresses include: http//www.passnownow.com / classwork-series-and-exercise-basic-science-jss3-depletion-of-ozone-layer-and-its-effects. www.unep.fr/ozonation/information/education packsecschool.htmt and www.study.com/academy/lesson/the-ozone-layer-importance-and-the-harmful-effect-of-thinning.html etc.

Statement of Problem

Nigeria teachers are used to talk-chalk/ traditional method of teaching, which makes the students passive in learning. This

traditional method keeps the students' passive in class, which contradicts the students-centred-learning-approach recommended by the Federal Ministry of Education (Federal Government of Nigeria, FGN 2004). Inappropriate method of teaching invariably leads to poor students' achievement in an examination. Experience has also shown that students learn at a high rate through effective and efficient use of Information and Communication Technologies (ICT) in teaching and learning. Teaching the Earth disaster/Ozone layer depletion related topics in the curriculum effectively may require the use of more effective instructional delivery method that is ICT based. Therefore, exploring Cloud computing PowerPoint presentation, using the following modes (text-pictures and text-animation) on students' achievement in basic science, is not only desirable but timely. The problem of this study as a question is: "How can students' science achievement be transformed through cloud computing PowerPoint presentation?

Purpose of Study

The general purpose of this study is to investigate the Transformation of students' science achievement through cloud computing PowerPoint presentation. Specifically, the study sought to:

1)Find the effect of text- picture and text-animation modes of PowerPoint Presentation of cloud content on science students' achievement.

Research Questions

The following research questions guided the study:

1. What are the effects of text-pictures and text-animation modes of PowerPoint presentation of cloud content on science students' mean achievement?

Research Hypothesis

The following null hypothesis was tested at 0.05, level of significance to guide the study.

HO1: There is no significant difference in mean achievement scores of science students taught basic science using cloud computing text-pictures and text-animation modes of PowerPoint Presentation.

Methodology

The design used for this study is quasi-experimental research design, specifically non-equivalent Control-Group design. The population of the study comprised all the 1359 JSS3 basic science students in the 11 co-educational public secondary schools in Gombe LGA. (Source: Post Primary School Management Board Gombe), the sample of the study comprises of eighty (80) JSS3 Basic Science students in two co-educational public secondary Schools in Gombe Central Development Council, Multiple stage sampling techniques was used for the study, purposive sampling technique was used to sample Gombe Central Development Council and the two schools that was used, a random sampling technique was used to draw two intact classes in the two schools and assignment of

classes to treatment conditions was by balloting. The treatment classes in each of the schools was exposed to either cloud computing text-picture or text-animation modes of PowerPoint presentation. The instrument used in collecting data for the study was Basic Science Achievement Test (BSAT). Four (4) BSAT items were adopted from (JSSCE) past questions while twenty-two (22) were adapted The BSAT was formally made up of forty (40) item questions but was reduced to twenty- five multiple choice questions with 4 options as advised by the validates. The validates consists of one from Science education, one from Educational Technology and one from Measurement and Evaluation all in the Gombe state University , Pearson Product Moment Co-relational Coefficient was used to determine the temporal stability which was 0.78 and Richardson Formula (K-R20) was used for internal consistency of the achievement test. The internal consistency was 0.63.This was considered high enough and therefore, the instrument was reliable. Mean scores and standard deviation was used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses. The PowerPoint Presentations were hosted on the cloud using www.datafilehostcom, a free cloud site.

Results:

The results were presented according to the research question and hypotheses.

Research Question I

What are the effects of text-pictures and text-animation modes of PowerPoint presentation of cloud content on science students' mean achievement?

To answer research question I, mean scores and standard deviation of students in Basic Science Achievement Test (BSAT) were calculated and presented in:

Table I: Mean and Standard Deviation Scores of Students exposed to text-pictures and text-animation modes of PowerPoint presentation of cloud content in Basic Science Achievement Test.

Modes of PFT	N	Pre-test		Pre-test		Mean Gain Score
		$\bar{X}$	SD	$\bar{X}$	SD	
Text-picture	40	9.58	3.22	18.48	3.62	8.68
Text-animation	40	8.83	3.11	18.95	4.07	10.12

Table I indicates that students in cloud computing text picture group had a pre-test mean score of 9.58 with a standard deviation of 3.22, post-test mean score of 18.48 with a standard deviation of 3.62 and mean gain of 8.68 while the cloud computing text animation group had a pre-test mean score of 8.83 with a standard deviation of 3.11,

post-test mean score of 18.95 with a standard deviation of 4.07 and mean gain of 10.12 in the achievement test. Therefore, Text- animation was superior to Text-picture in teaching students Basic Science.

Hypothesis I

HO1: There is no significant difference in mean achievement scores of science students taught basic science using cloud computing text-pictures and text-animation modes of PowerPoint Presentation.

Table 2: Summary of ANCOVA Table on Modes of PPT of cloud content

Source of Variation	Type 111 Sam of Squares	Df	Mean Squares	F.cal	Sig	Partial Eta squared
Corrected Model	119.464	4	29.866	2.152	.083	.103
Intercept	2164.471	1	2164.471	155.953	.000	.675
Pre-test	63.605	1	63.605	4.583	.036	.058
Modes	17.832	1	17.832	1.285	.261	.017
Error	1040.923	75	13.879			
Total	29173.000	80				
Corrected Total	1160.388	79				

In order to make a decision on students' achievement based on the use of Cloud computing text-picture and text-animation in teaching Basic science, hypothesis 1 was tested. From table 2 above, the main effect for media F (I, 80) = 1.285, P < .261. There was no significant difference between the mean achievement scores of students in Basic Science when taught using cloud computing text-pictures and text-animation modes of PowerPoint Presentation. Therefore, the null hypothesis was accepted.

Discussion of findings

The result presented in the Table 1 indicated that the students taught using the cloud computing text-animation mode achieved significantly higher in Basic science achievement test than those taught with cloud computing text-picture mode. The significant difference could be as a result of the ability of the text animation to combine text, graphics and animation in the learning process. This feature provides a concrete basis for critical thinking. The result of this study upholds Bandura's social-cognitive learning theory which says that the observer

cognitively transforms stimuli before responses are made.

The results on Table 2 revealed that, there was no significant difference between the mean achievement scores of students in Basic Science when taught using cloud computing text-pictures and text-animation modes of PowerPoint Presentation. Therefore, the null hypothesis was accepted. The acceptance of the null hypotheses however, proves that the two modes of cloud computing PowerPoint presentation can enhance or increase students mean achievement score. This is supported by Karen (2014), who pointed out that PowerPoint slide presentation has become a part of many instructional setting and can also be a highly effective tool to aid learning

Conclusion/Educational Implication

Based on the fore-mentioned findings of this study, it can be concluded that academic achievement can be significantly increased by utilizing cloud computing text-animation mode of PowerPoint presentation.

The findings of this study have obvious educational implications for teachers and the ministry of education. As an investigative study, the findings provide useful feedback on the relative efficacy of cloud computing text-animation mode of PowerPoint presentation. The feedback will now provide the basis upon which Basic science teachers are expected to build to enhance their instructional process. Teachers are also expected to host their instruction (text-animation PowerPoint presentation) on the cloud and also link it to related site of interest.

Teachers should also bear in mind that cloud computing text-picture mode is probably best suited for topics in which the subject-matter have intrinsic visual and action interest and explanations not all topic and in all cases.

Recommendation

In view of the findings of the study the following recommendation were given.

1. Basic science teachers should make use of cloud computing animation and as well, plan their lessons ahead of time to effect the desired result.
2. Training, Orientation courses, workshops and seminars on how to design learning process using good presentation software like PowerPoint presentation and cloud computing should be conducted.
3. Government and school authority should provide computer with internet access to help students explore the cloud computing PowerPoint presentation and other recommended linking sites.

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