Designing Software for Teaching Economics and other Social Science Courses in FCT College of Education. Zuba

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Abstract

This paper aims to establish the impact of designed information and communication technologies (ICT) software on teaching and learning in colleges of education in Nigeria. The thrust of the paper is to help higher education teachers know, and be able to deploy certain ICT software towards shifting from teacher-centred pedagogy to learner-centred instruction for increased quality of teaching and learning. To this end, the study employs a quasi-experimental research design method to experiment the impact of the designed software on a Purposively sampled 240 respondents drawn from 12,018 economics students' population at FCT College of education Zuba, Abuja. Pre-test and post-test students' academic records from Mathematics for economics, macroeconomics, research methods, microeconomics, statistic I and II and Economics of Production were obtained. Data obtained were analysed using mean, one-way ANOVA and Regression analysis. Findings shows that the used of the designed ICT devices has greatly improve the levels of teaching and learning of economics in FCT College of Education Zuba, Abuja. The study thus recommended that teachers should be made to adopt teaching methods and materials to integrate the designed ICT device into their teaching, management should design some avenues where students are motivated to improve their learning by adopting new ways and materials with the designed ICT device and that, government and other stakeholders need to help in assisting for the emergence of a culture for collaboration between all staff involved in the use of computer based device in teaching and researching.

Executive Summary

The study sourced data from both primary and secondary sources. The primary source consist of students' academic performances in economics in the period of using modern technology based teaching method in selective economics course. While the secondary data are sourced students past results in the selected courses over the periods when modern technological gadgets was not introduced. A deviation analysis is then performed to see whether there is any deviation in level of academic performances. The result of the research is an epoch making contribution to the field of teaching and learning in general, economics and social sciences in particular.

On completion the study, the researchers a workshop/seminar is organized showcasing the new discovery (ies). The findings are made available to the general public particularly the stake holders (i.e. School administrators in secondary and tertiary institutions, educational administrators, ministry department and agencies of education, UNESCO to mention but few.

Introduction

Education generally is a pathway toward emancipation of individuals and the society at large. The major reason for educating a generation is to make the generation worthwhile specie of individual. Education is not all about making a student literate but to be rational in thinking, knowledgeable and self-sufficient. Permit to say that education is a light that shows the mankind the right direction to surge.

Economics is a social science that Studies human behaviour in the disposal between ends and scarce means which has alternatives uses. The human behavioural aspect of the above definition makes economics as a subject and course of study at the secondary and tertiary education level in Nigeria especially at the college of education level to be dynamic, complex, comprehension and high intensive to teach. In addition, the world is going digitally gaga and technology is taking over the whole system. The reverse to technology today, in all aspect of life, especially in teaching and learning cannot be compromised most especially in teaching economics and other social science. In line of this fact, there is an astute need to make a u- turn from the dogmatic/traditional methods of teaching and learning of economic toward a digitalized and technological based teaching and learning system.

A cursory look at the education system in Nigeria and FCT College of education in particular over the years has shown that the system is decaying and there is a dare need for restructuring and improvement most importantly in the area of teaching methods. The Nigerian education is seriously bed-rocking to the extent that educational value is seriously going into extinction. One of the reason giving is that quality of instructions in our citadel of learning is diminishing and not in tandem with global trend. To this end, there is a dare need for restructuring and rebranding teaching methods in the Nigeria educational system to conform to obtainable international standard.

It is in lieu of this that this research is designed to bring out the lacks that is endemic in the present traditional system of teaching and learning in Nigeria higher institutions and make case for embracing of modern and technological based system of learning. This study is a skill based and observational

research aimed at looking at students' outcome using different traditional methods of teaching as compared to the modern-technology based teaching method using some multimedia.

This study want to make a deviation from the past and initiate a system of learning which embraces, multimedia learning process (interactive learning process), mind mapping, brainstorming, humorous, affective method of teaching, role playing and scenario model approach to teaching and other aspect of modern teaching methodologies in order to improve the quality of teaching and learning economics and other social science courses in FCT College of Education, Zuba and Nigeria in general. The optimism is that at the end, quality skills will be acquired by instructors in our citadel of learning that will help improve general education and most importantly teacher education in Nigeria.

Problem Statement:

The present structure of the economic systems today has clearly shown that economics is increasing in importance in our social and political life; therefore, it is critically important that it is taught well by well-trained teachers. There are a variety of alternatives to the traditional "chalk and talk" way of communicating basic economic ideas and concepts. Although the standard lecture format is still the overwhelming favourite among professional economics lecturers at colleges and universities around the world, many economic educators favour using alternative methods to engage students in their learning process. This advantage has not been harnessed in Nigerian Colleges of Education most particularly FCT College of Education Zuba.

Effective performance of a teacher most especially at higher/ tertiary institution does not involve just the proper lecturing competence but the application of the right methodological strategies to meet student's needs. With the prevalence of social media and the growing access and usage in the past several years, In academia a new pedagogical tool need to be engaged for students both inside and outside the economics classroom, and impact their overall success.

Motivation

Like in the United Kingdom and other developed countries where PowerPoint presentations of lectures, WebCT (a LMS) for filing of lecture notes, e-mailing tutors (which is usually available all the time and for some), the submission of coursework and assignments online and discussions of course topics through Facebook are all seen as normal. Also, in Switzerland, the use of LMS/LMCS in higher education institutions is common. The researcher drew inspirations from these places and

belief that lessons abound for us from these and other spatial experiences and alongside valuable recommendations that are to made, these things can happen in higher educational institutions Nigeria, particularly FCT College of Education, Zuba, Abuja. For example, the use of social networking sites, which are driven by students, can have real value over study periods when students are away from the campus as well as being able to discuss issues with other students in different institutions on similar courses.

Justification of The Study

Teacher

Enable them to focus on the acquisition of threshold concepts and apply them in a large range of concept. The economic threshold concepts (ETC) project has working papers (handouts), articles and reading and a wide range of teaching articles. It will make teacher to be computer literate and be expertise in handling technological approaches in teaching economics and other social science courses. It will expose the teacher to the outside work more proper and faster. Some of our teachers have limited or little exposure in term of modern method of teaching. This will help them in extending the horizon.

Student

It will enable student to learn faster and understand the lesson thought

It will enable the student to gain much more by focusing on economic literacy.

One of the approaches we are introducing is to make extensive use of classroom experiment. These will be funfair. The approach will make student have funs and give a real insight into core economic and social science issues.

It will improve students reading and learning ability, this hitherto will improve their academic performances.

One examination session will be computer based. This will help the pupil to greatly understand and appreciates computer base examination as an easiest and meaningful way of passing and evaluate instructions.

The use of the web to teach will motivate the students by showing them the relevance of economics to everyday topics and current events help them to conduct background research before classes and provide a spectrum of points of view on contemporary topics.

Objectives of The Study

The General objective of the study we intend to undertake is to designing a new method and tool of

teaching economics and other social science courses in FCT COE Zuba. Specifically/ the study intends to;

1. Improve teachers (lecturers) skills on the use of new and innovative method of teaching economics and other social science courses.

2. Enable the teacher (lecturers) appreciate the rationales and advantages inherent on the use of computer based examination in tertiary institution.

3. Help in general improvement of standard of education in Nigeria and FCT College of education in particular most importantly in areas of curriculum designs, course pedagogy development, teaching and learning and evaluation of learning process.

Research question

1. Do using information and communication technologies have a positive effect on students' achievement level in economics and other social science courses?

2. Do using information and communication technologies have a positive effect on students' attitudes towards economics and other social science courses?

3. Do using information and communication technologies have a positive effect on students' attitudes towards ICT itself?

Literature Review

Effective and efficient teaching methods are distinguished by a number of factors. These factors according to Fagbemi (2007), includes sources of knowledge, the level of students active approach, operations of thought, to mention but the few. These sources accordingly transform the context of education into particular teaching process.

A teaching method is primarily characterized as the procedure for achieving the objectives of education. "A teaching method is the coordinated system of a teacher's activities and student's learning activities focused on achieving the objectives set by a teacher and accepted by the students" (Mank, 1990)

In classifying teaching method, Harausova (2011) opined that teaching methods is diversified and their rate of diversity are as followed amongst others:

- *Verbal methods*, this include monologic (description, explanation, narration, lecture, interpretation), dialogic (debate, discussion, dramatization) and methods of working with a textbook, book, text.

- *Methods of illustrative demonstration*. This include observation of objects and phenomena,

showing objects, models, experiments, activities, demonstration of static images, dynamic and static screening, training of locomotive and work-related skills, students' work in laboratories, work- related methods etc.

- ***Teaching methods according to the activity.*** Here, student learning activities are divided into narration and discussion, individual work of students, investigative and research activities.

- ***Teaching methods according to the operation of thought.*** Elements in this method include comparative methods, inductive methods, and deductive methods, analytical and synthetic methods.

- ***Teaching methods according to the teaching phases***. Included here are motivational methods, exposure methods, fixation methods, diagnostic methods, application methods among others.

- ***Teaching methods according to the teaching forms of didactic tools***. These are combination of methods of teaching forms and teaching aids.

- ***Critical thinking development methods***. They are Socratic methods involving questioning, writing, essays, case studies, scenario method, the EUR thinking and learning strategy, etc.

- ***Methods of creative thinking development***. They are heuristics DITOR, TRIZ, challenging questions method, checklist methods, Ideals; quick Brainstorming storming, project methods etc.

Apart from the above, other methods exists but these are considered for the essence of this work.

The essence of any teaching method stems in the way of achieving the required status. The cooperation of the three elements, namely a teacher, student and the content of curriculum is necessary. In the teaching process a teacher trainer acts as a facilitator of the content, helps the student in acquiring knowledge, explains knowledge through examples using an adequately selected teaching methods, points out at common features and connections, explains logical structure and connectivity. "He or she should be an excellent pedagogue and should be willing to apply them in teaching the student. A teacher should be a professional, who updates and makes lectures and exercises more attractive in order to make them as clear as possible for students and beneficiaries for the development of their personalities." (Blaskova, 2012)

A student acquires knowledge through an active approach. The level of a student's active approach is directly proportional to the teaching method selected by a teacher, which has material impact on achieving the goals. Teaching method is therefore a way of how a teacher performs activities affecting the way the student acquires knowledge. As maintained by Vodak and Kurcharcikova (2011), there is

no clear-cut guidance on how to select the most appropriate and the most effective method. To them, selection of the appropriate method depends on the circumstances. It is therefore advisable to alternate ones method of teaching, which can be a part of the general change in the culture; however, the impact of the previous teaching methods on the current must be taken into consideration. In lieu of the above, active learning must be the valuable ingredient for achieving successful education most importantly in colleges of Education and pertinently in the field of economics.

Education specialists agree that instructors should use active learning. Active learning may be particularly important in economic education where the over-arching goal is to help students "think like economists" (Siegfried, 1991). Active learning helps students think like economists by providing structured opportunities where they apply economic ideas to answer questions and solve problems. Despite its potential, active learning is seldom used in economics. Chalk-and-talk is the dominant pedagogy in all courses at all types of tertiary education in Nigeria and there need to be an innovation on this.

Methodology

Research Design

The study employs a quasi-experimental research design.

Description of population

The study population cover the entire students of FCT College of Education Zuba Abuja. The total population is 12,018 students. The male are 4,694 students while the females are 7,324 in numbers.

Sampling size and technique

The sampling size for the study is 240 respondents. Purposive sampling is used for the study. The reason for using the purposive sampling centres on the need to target students of economics department in NCE I, and II and the yet to be admitted ones.

 Also the fact remains that the researchers are currently lecturers in the department.

Sample Procedure

The purposive sampling is done by purposively chosen Economic department for the study. In this regard letter is written to the head of department and the Dean of School of Arts and Social sciences for the initiation of the project and its take-off. Math for economics, macroeconomics, research methods, microeconomics, statistic I and II and Economics of Production are purposively chosen for the survey. The reason for taking these courses is because of their predominance and suitability for the study.

Data collection and analysis

Data collection and analysis will be collected via the administration of examination. The data was collected both at the beginning (pre-test) and the end (post-test) of the application from both experiment and control groups. Data was subjected to mean, one way ANOVA and Regression analysis to establish if there is any variation in academic performances between student thought with modern method of teaching and those thought in the traditional lecture based method.

The subjects of the study were two groups of students of economics department in NCE I, and II and the yet to be admitted ones. The number of students in both experiment and control groups were the same i.e. each group was consisted of 120 students. The school did not allow the researchers to assign control and experimental groups randomly. However, both groups of students were similar in terms of number of students, gender compositions, academic achievement level in the school and their socio-economic status before the experiment. Those variables were treated as covariates in the analysis.

Three different research tools were used to collect data: an academic achievement test on of economics students before and after introducing the Designed ICT Software, an Attitude measurement scale of Economics students and, an Attitude measurement scale on Designed ICT Software. In order to understand the possible positive impact of Designed ICT Software usage on Student's achievement level, a valid and reliable achievement test was necessary. It was also necessary to understand its effect on Student's Attitudes towards the subject and Designed ICT Software. Thus, designed ICT software and Economics student Attitude measurement scales were developed.

Validity And Reliability of the research instruments

The research instruments developed in the following manner; the researchers developed a pool of multiple choice (4 choices for each question) questions for the unit that has to be taught during the experiment period. The pool of questions was crosschecked by three other teachers of Economics. Taking into consideration their criticism, some of the questions were omitted (8 in total) and some question added (2 in total) to make sure content validity has been reached. There were 40 questions left for the pilot study. The achievement tests (and Attitude scales) were piloted with 120 students. After running test for reliability and difficulty for the items, there were 30 questions were left. Exactly the same procedures were followed for the Attitude measurement tests. The only differences were that the item pool consulted by experts was other Economics lecturers and experts in measurement and evaluation in the school of education, FCT College of Education, Zuba as well as Faculty of Education, University of Abuja, Nigeria rather than teachers, and the number of the items were

varying from test to test. After piloting all the research tools reliability of Economics achievement test is .84 Cronbach's Alpha. Reliability of Economics Attitude measurement scale is .89 Cronbach's Alpha. Reliability of the Designed Ict Software Attitude measurement scale is .97 Cronbach's Alpha.

The treatment

The respondents are further divided into two.

Group 1

Students to be taught without the use of modern equipment to teach (experimental group)

Group 2

Students to be taught with the use of modern instructional materials (controlled group)

Because of the knowledge, skills and values that are covered, there were numerous opportunities for the teacher to integrate Designed ICT Software in the teaching process. The teacher utilized a CD containing courses that are taught during the time period covered. The CD contains drill and practice applications,

Having decided on which group (class) will be the experimental group and which one is the control group, the researchers applied data collecting tools as pre-test at the beginning of the treatment. Then, the treatment started for the experimental group. The treatment lasted for 5 weeks (this is the time officially allocated for the courses). At the end of the treatment the same data collecting tools were given to students as post-tests.

Apriori Results

It is expected that there should be a wide variation in academic performances of student thought with modern method and software of teaching and those thought in the traditional lecture based method.

While the above apriori is established, the result is established and stands as bases of generalisation.

The tools developed and results generated will then be documented and presented at workshops/seminars organised by the researchers and eventually published

Data analysis

The differentiations between pre-test and post-test scores of experimental and control groups from the achievement test, Designed ICT Software Attitudes scales and Economics Student's Attitudes scales are given below.

	Group	N	Mean	*SD*	S Error	*t*	*p*
Designed ICT Software Attitude. pre-test	Experimental	120	3.4731	.33679	.05693	.772	.443
	Control	120	3.3832	.60033	.10147		
Designed ICT Software Attitude. post-test							
	Experimental	120	3.4370	.45487	.07689	1.996	.050
	Control	120	3.2193	.45750	.07733		
Economics Student Attitude. pre-test	Experimental	120	3.4641	.50546	.08544	-2.347	.022
	Control	120	3.6994	.31021	.05243		.
Economics Student Attitude. post-test	Experimental	120	2.3407	.28016	.04736	-2.311	.024
	Control	120	2.4733	.19178	.03242		.
Achievement pre-test	Experimental	120	18.6857	6.25334	1.05701	2.1120	.036
	Control	120	15.6571	5.59907	.94642		.
Achievement post-test	Experimental	120	20.4571	5.04884	.85341	3.643	.001
	Control	120	16.0286	5.14773	.87013		.

$p < .05$

There is no statistically significant difference between experimental and control groups on their Designed ICT Software Attitudes pre-test scores. This means that both groups of Student's Attitudes towards Designed ICT Software were similar at the beginning of experiment. However, there is a significant difference between experimental and control groups' Designed ICT Software Attitudes post-test scores in favor of experimental group. It seems that the treatment had a positive effect on Student's Attitudes towards Designed ICT Software

The table shows that there was statistically significant difference between experimental and control groups' Attitudes towards Economics education in favor of control group at the beginning of experiment. There was still significant difference between those two groups in favor of control group about their Attitudes towards Economics according to their post-test scores. Post-test scores of both groups were lower than their pre-test scores on Economics

Attitudes scale. This means the treatment did not improve experimental group's Attitudes towards Economics education.

Experimental group's academic achievement pre-test scores were significantly higher than control group's scores. Their post-test scores on academic achievement were also higher than control group's scores. The difference between post-test scores of both groups on achievement test was much greater than their pre-test score on achievement test. This means, the treatment had a positive effect on Student's academic achievement.

In order to understand the variables' effects on observed variance in students post-test scores on academic achievement test, blockwise regression analysis was carried out.

Table 2._Blockwise regression model of Student's achievement post-test scores_

Model	R	R Square	Adj. R square	Std. Error	Change Statistics				
					R square Change	F Change	df1	df2	F P(sig.)
1	.474	.225	.189	4.91094	.225	6.369	3	66	.001
2	.502	.252	.194	4.89669	.028	1.192	2	64	.310
3	.589	.347	.285	4.61193	.095	9.147	1	63	.004

When achievement post-test scores were treated as dependent variable, and achievement, Economics Attitude and Designed ICT Software Attitude scales pre-test scores entered as first block, Economics Attitude and Designed ICT Software Attitude scales post-test scores entered as second block, group as in experiment and control group entered as the final group in blockwise regression analysis, 120 per cent of variance in Student's post-test scores of academic achievement test in Economics was explained.

Those variables included in the first block explained 23 per cent of variance in Student's academic achievement post-test scores ($R = .474$, $R^2 = .225$, $p < .05$). The variables included in the second block did not contribute in explaining the variance in Student's academic achievement post-test scores ($R = .502$, $R^2 = .252$, $p > .05$). The variable included in the third block explained 10 per cent of the variance in Student's academic achievement post-test scores ($R = .589$, $R^2 = .347$, $p < .05$).

Table 3. _Standardized regression coefficients of Student's achievement post-test scores_

Independent Variables	Unstandardized coefficients		Standardized coefficients.	t	p
	β	S. Error	Beta		
Constant	13.847	8.531		1.623	.110
Designed ICT Software Attitude. pre-test	-1.200	1.220	-.106	-.984	.329
1. Economics Student Attitude. pre-test	2.888	1.436	.229	2.012	.049
Achievement pre-test	.1205	.104	.383	3.430	.001
Designed ICT Software Attitude. post-test	.381	1.288	.033	.296	.768
2. Economics Student Attitude. post-test	-1.715	2.501	-.077	-.686	.496
3. Group	-3.775	1.248	-.349	-3.024	.004

Regression analysis shows that Student's academic achievement levels were not affected by their Attitudes towards Designed ICT Software and Economics. Their academic achievement is affected by their prior knowledge on the subject matter (achievement pre-test scores) and learning method i.e. learning Economics with the help of Designed ICT Software. Their prior knowledge and delivery method affect Student's achievement positively. Students in the experimental group have statistically significant higher post-test achievement scores that those in the control group. The second regression analysis is carried out to understand the variables' effect on Student's Attitudes on Economics.

Table 4. *Blockwise regression model of Economics Student's Attitudes post-test scores*

Model	R	R Square	Adj. R Square	Std. Error	Change Statistics				
					R square Change	F Change	df1	df2	F Change. P(sig.)
1	.1207	.128	.088	.21204	.128	3.215	3	66	.028
2	.404	.163	.098	.23410	.036	1.373	2	64	.261
3	.442	.195	.118	.23144	.032	2.477	1	63	.121

When Economics Student's Attitudes post-test scores were treated as dependent variable, and achievement, Economics Student's Attitude and Designed ICT Software Attitude scales pre-test scores entered as first block, Designed ICT Software Attitude scales post-test scores and achievement post-test scores entered as second block, group as in experiment and control group entered as the final group in blockwise regression analysis, 20 per cent of variance in Student's post-test scores of academic achievement test in Economics was explained.

Those variables included in the first block explained 13 per cent of variance in Economics Student's Attitudes post-test scores (R=.1207, R²=.128, p<.05).The variables included in the second block did not contribute in explaining the variance in Student's Economics Attitudes post-test scores (R = .404, R² = .163, p > .05).The variable included in the third block did not contribute in explaining the variance in Student's Economics Attitudes post-test scores(R=.442, R²= .195, p > .05).

Table 5. *Standardized regression coefficients of Student's Economics Attitude post-test scores*

Independent Variables	Unstandardized Coefficients		Std. Coefficients	*t*	*p*
	β	S. Error	Beta		
Constant	1.788	.374		4.774	.000
Designed ICT Software Attitude. pre-test	.002	.062	.004	.030	.976
Economics Student Attitude. pre-test	.141	.072	.247	1.949	.056
1. Achievement pre-test	.010	.006	.249	1.894	.063
Designed ICT Software Attitude. post-test	-.043	.064	-.082	-.665	.508
2. Achievement post-test	-.004	.006	-.096	-.686	.496
3. Group	.103	.066	211	1.574	.121

Analysis shows that no single variable contributed to explaining the observed variance in Student's Attitudes towards Economics education. Sometimes it may not be possible to explain observed variance in any given behavior by one single variable. Regression type analysis is used to analyze the variables in blocks which bear similar characteristics as in the analysis above. Although no single variable is important in explaining Student's Attitudes towards Economics, their pre-test scores of achievement test, Economics Attitudes and Designed ICT Software scores altogether have an impact on Student's forming Attitudes towards Economics.

The third regression analysis is carried out to understand the variables' effect on Student's Attitudes on Designed ICT Software.

Table 6. *Blockwise regression model of Student's Designed ICT Software Attitudes post-test scores*

Model	R	R Square	Adj. R Square	Standard Error	Change Statistics				.
					R square Change	F Change	df1	df2	F Change P(sig.)
1	.383	.146	.108	.44536	.146	3.775	3	66	.015
2	.402	.161	.096	.44834	.015	.563	2	64	.572
3	.407	.166	.086	.45070	.004	.332	1	63	.567

The third regression analysis treated Student's Attitudes toward Designed ICT Software as dependent variable. No single variable had any significant effect in explaining observed variance in Student's Attitudes towards Designed ICT Software. The first block variables of Designed ICT Software Attitudes, Economics Attitudes and achievement pre-test scores explained 15 per cent of observed variance (R=.383, R²=.146, p<.05). Second block variables of Economics achievement and Attitude post-test score (R= .402, R²= .161, p> .05) and third block variable of group did not have any effect in explaining the observed variance (R = .407, R² = .166, p> .05). Nevertheless, the three blocks all together explained 17 per cent of observed variance in Student's Attitudes towards Designed ICT Software. Only the first block variables positively impacted Student's Attitudes towards Designed ICT Software.

Table 7. *Standardized regression coefficients of Student's Designed ICT Software Attitude post-test scores*

Independent Variables		Unstandardized Coefficients		Std. Coefficients	*t*	*p*
		B	S. Error	Beta		
Constant		3.619	.718		5.038	.000
1.	Designed ICT Software Attitude. pre-test	.221	.117	.226	1.891	.063
	Economics Student Attitude. pre-test	-.222	.142	-.204	-1.566	.122
	Achievement pre-test	.012	.011	.155	1.137	.260
2	Achievement post-test	.004	.012	.042	.296	.768
	Economics Student post-test	-.163	.244	-.085	-.665	.508
3	Group	-.075	.130	-.080	-.576	.567

The analysis shows that the treatment and Student's achievement and Economics post-test scores do not have any effect on their Attitudes towards Designed ICT Software. Nevertheless, the first block variables which are not important on their own have a positive effect on Student's Attitudes towards Designed ICT Software

One of the interesting points is that Student's pre-test Attitudes towards Economics are negatively correlated with their pre-treatment Attitudes towards Designed ICT Software Although statistically not significant, similar result is observed with their post-test scores of

Economics and Designed ICT Software Attitudes scales. The effect of Economics Student's Attitudes post-test scores on their Designed ICT Software Attitudes scores is less than their Attitudes pre-test scores' effect on their pre-test Designed ICT Software Attitudes scores. This finding means that the students whose achievement test scores are higher statistically have slightly higher positive Attitudes towards Designed ICT Software as a result of the treatment.

Discussion of findings

The study shows that integration designed ICT device into the classroom has a slightly positive effect on students' achievement. This finding is supported by the works of Egbe (2015); Njoku, (2013). The positive impact of designed ICT device on students' achievement is what educators would want to happen in a situation that is going to happen anyway. What they needed here is that teachers should adopt teaching methods and materials to integrate the designed ICT device into their teaching practice. The teacher by using an interactive CD which contains historical facts, still and moving images, questions, feedbacks and digital maps, and employing more students centered teaching approach such as group work and inquiry based teaching, appears to make a small contribution to students' achievement level. It is not straightforward process to make students achieve better through ICT integration (Njoku (2015); African Leadership in ICT Program (2011). Contrary to achievement and many research findings such as Edokpolor, (2018) and Balanskat, Blamire & Kefala (2006) ICT did not have any effect on students' attitudes towards economics in this study. Because there are many research reports both supporting and rejecting the finding that ICT does not have any effect on students' attitudes towards the subject in question. However, it did have an effect on students' attitudes towards ICT. Familiarity and knowledge are important for people to have positive attitudes towards ICT (Tobin & Tippins (2019); Ogwu & Ezema, 2016). Students in this study formed positive attitudes after realizing potential of ICT in their learning. Positive attitudes towards designed ICT device not necessary will have a positive effect on students' attitudes towards the subject or on achievement. It may be worth noting that students' attitudes towards ICT might lead to frequent use of ICT. Nevertheless, the quality of its use matters the most, non-academic use may hinder learning (Azeta., Oyelami & Ayo (2008)

Findings from regression analysis suggest that the students' attitudes towards the subject i.e. economics and ICT do not have an effect on their post-test achievement scores. However, their

prior knowledge on the subject and the treatment i.e. teaching economics with ICT has a positive effect on their achievement. Those students in the experiment group had higher achievement test scores than the students in control group did. This might be the most important finding in this study. The implication of this finding on economics (and on similar subjects) might be important. What we know now from this particular study is that there is a glimmer of hope that teachers can help their students achieve better with the help of ICT. As with other innovations in education, the impact ICT on students' achievement is not very apparent. Nevertheless, there is an opportunity to improve students' learning by adopting new ways and materials with ICT.

The blockwise regression analysis also suggests that teaching economics with ICT do not have any statistically significant effect on students' attitudes toward economics lesson. The claim about the effect of designed ICT device on students' attitudes was not valid for this study. Teachers and other educators might be able to use ICT in ways to make students' attitudes better.

Educational Implications of the Study

The findings of this study have provided empirical evidence for the use of ICT software in learning Economics. The findings of this study have some implications for lecturers, teachers and students, policy makers and curriculum developers. One obvious implication is that Economics teachers would promote achievement and interest in Economics teaching by developing and sustaining students' interest in the subject. This can be achieved through the use of ICT software in the teaching and learning of the subject.

Furthermore, leading students to develop and use ICT software will assist the teacher in providing learning environment that will be conducive for the teaching and learning of Economics.

For curriculum planners, this does suggest a careful reappraisal of Economics curriculum implementation strategies to ensure the incorporation of activities that will encourage the use of ICT software.

Conclusion

Based on the application of these software in the act of teaching and learning economics in our study are the study thus concluded that the used of the designed ICT devices has greatly improve the levels of leaching and learning of economics in FCT College of Education Zuba, Abuja.

Recommendations

Based on the findings and conclusions made on the study, the following recommendations are proffer that;

i.   Teachers should be made to adopt teaching methods and materials to integrate the designed ICT device into their teaching practice.

ii.   Teachers training programs of ICT integration has to subject oriented and carried out in a workshop manner over a long period of time. Concurrent training when organized by the college management and other relevan stakeholders like the Ministry of Federal Capital Territory (Education Secretariat, The Tertiary Education Fund (TETFUND), National Commission for Colleges of Education, Colleges of Education Academic Staff Union (COEASU), will go a long way to improve academic staff literacy and efficiencies on the use of the designed ICT device in teaching and researching.

iii.   ICT tools and connectivity should be deeply integrated into our classrooms and used across the curriculum.

iv.   Some technologies will be easier to introduce into the teaching environment than others. Students should be encouraged to use those forms of ICT that they currently use in social situations—such as social networking sites—for their academic work. It will be a good experiment to introduce newer forms—such as wikis, which are perceived to be little used in education (although in reality they tend to be in use to a certain extent).

v.   Deploying newer and earlier forms of ICTs will require different approaches from teachers and course designers. The college management will need to support the staff to deliver this. The college management need to be aware of the way students already use social networking sites, so as to help students to use the networks they already have in place. They also have to know that some students at present do not use social networking sites at all.

vi.   Management should design some avenue where students are motivated to improve their learning by adopting new ways and materials with the designed ICT device.

vii. Government and other stakeholder need to help in assisting for the emergence of a culture for collaboration between all staff involved in the use of computer based device in teaching and researching.

viii. Further research (both qualitative and quantitatively studies) should be carried out on the use of designed ICT device in teaching and researching.

ix. Teachers' focus should not be misled by the positive attitudes towards ICT but they should really focus on achievement and attitudes towards subject matter.

The future

Personal computers are, sadly, still out of the reach of many students in most households, especially in developing nations. The ubiquity, acceptability and accessibility of mobile phones today give them the quality to be the central technology for tomorrow's higher education. Colleges of education managements should partner with software developers and phone makers to ensure that the world has its most affordable phones able to open virtual campuses and upload and download files from them. A time is expected when digital books, hybrid mobile computers and touch-screen writing tablets will be in the hands of every students and lecturer alongside, if not to replace, the text book, chalk and chalkboard. Since computer applications are increasingly moving away from being those of standalone desktop and laptop computers to those of cloud servers, cloud computing will make information cheaper and more available if the ubiquitous connectivity that many movements are working towards is provided, and this has great positive implications for use of ICTs in Colleges of Education.

This authors agrees completely with the science and technology education specialist in the World Bank, Hawkins (2010), who observed that the ordered physical classroom of desks might quickly become a relic of the industrial age as schools around the world are re-thinking the most appropriate learning environments to foster collaborative, cross-

disciplinary, student-centred learning. Also, we should not be heading into the future with the idea of the traditional one-hour lecture period. Lecturers should begin to think of being virtual teachers or mentors as opportunities for peer-to-peer and self-paced, deeper learning increase. Investigations in order to expatiate on or disprove these future possibilities are needed.

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