

# Assessment of Information and Communication Technology Integration in Teaching and Learning in Institutions of Higher Learning

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## Abstract

Employing survey research design of the ex-post facto type, this study examined information and community technologies integration in teaching and learning in institutions of higher learning in Delta State, Nigeria. Four research questions and four hypotheses guided the investigation. Descriptive statistical tools such as mean and standard deviation were used to answer the research questions while t-test of significant difference was used to test the hypotheses. A sample of 560 students and lecturers were selected through simple random sampling technique from four out of seven institutions of higher learning in the state. The result obtained showed that the level of availability of ICTs for their effective use in teaching and learning in institutions of higher learning in Delta State is low. The benefits of using ICTs in teaching and learning include improve quality of instruction, caters for different learning styles and increased opportunity for collaborative networking and research. The factors acting as barriers to effective integration of ICT in teaching and learning in the institutions include poor government attitude to ICT policy, inadequate funding of ICT facilities and low level of ICT literacy among students and Lecturers. The strategies for effective integration of ICT in teaching and learning in the institutions were identified to include provision of electronic classrooms and laboratories, provision of pedagogical training in ICT for Lecturers. The study recommends that administrators of institutions of higher learning should incorporate ICT into their strategic plan to ensure that they link the institution with Local Area Network (LAN).

**Keywords:** availability, barriers, benefits, information and communication technology, learning, strategies, teaching

## 1. Introduction

All over the world, education has been recognized as a critical tool for effecting national development. In fact, education is a catalyst for social, economic and personal changes. One of the changes and innovations which the federal government of Nigeria adopted in her development efforts is the integration of information and communication technology into all levels of the education system. The objectives of the federal government of Nigeria on Information Technology (IT) as highlighted by Yusuf (2005) are:

Making Information Communication Technologies (ICTs) mandatory at all levels of education

Developing ICTs curricula for primary, secondary and tertiary institutions

Provision of study grants and scholarship on ICTs

Training the trainer scheme for National Youth Service Corps members

ICTs capacity development at zonal, state and local levels.

Information and communication technology refers to as a computer based facilities used by organization personnel to record, transmit, generate, retrieve, impact knowledge and process information and communication needs (Asiyai, 2010). ICT is any technology that students and teachers use to organize, create, manipulate, solve, find, draw, design, synthesize, share, collaborate, modify, analyze, evaluate and disseminate information. ICTs include internet, computer, hyper net software and hardware, network, data projector and other devices that

convert information into digital forms.

In this era of digitalization the flow of information through the satellite and internet enhances rapid dissemination of knowledge “which has become the most important factor in economic development in the 21<sup>st</sup> century” (Saint, Hartnett, & Strasser, 2003), it becomes imperative for ICT to be applied to teaching and learning in schools across the universe. ICT has been recognized as effective for use in the education industry as an effective delivery mechanism (Westera & Sloep, 2001). They maintained that ICTs can provide an efficient delivery mechanism of educational services by supplementing conventional delivery mechanism.

The emergence of ICTs has generated lots of changes and innovations in all sectors of the economy across the globe. As a result, of the impact of ICTs, the whole world has been transformed into a global village. According to Johnson (2007), the prevalence and rapid development of ICTs have transformed human society from information technology age into knowledge age. As noted by Omeniyi, Agu, and Odimegwu (2007), the education industry appears to be the major sector where ICT integration and effective application could extend massively to other areas of life. This assertion presupposes that educational institutions in Nigeria be technology-based with teachers and students being information and technology literate so as to facilitate effective application of ICTs to other areas of life. As a result of the use of information and communication technologies, distance education is acceptable world wide as a standard alternative mode of education (Ojokheta & Adepoju, 2007).

Most developed communities have invested largely in centralized media systems that enable information to be broadcast to their schools at one time. Schools in such communities have a common cabled computer and media network. Teachers monitor activities rather than directing, in order to encourage creativity in technology. Though literature is replete on ICT, most of these literatures all cover studies in foreign countries. In Nigeria and Delta State in particular, there are limited literature on ICT integration in teaching and learning in higher education institutions. This study attempts to fill this gap.

### *1.1 Objectives of the Study*

This study had four objectives as follows:

Find out the views of lecturers and students on the availability of ICT for its integration in teaching and learning in institutions of higher learning in Delta State, Nigeria.

Identify the benefits of ICT integration in teaching and learning in institutions of higher learning.

Highlight the barriers to ICT integration in teaching and learning in institutions of higher learning in Delta State, Nigeria.

Identify the possible solutions to the identified barriers to ICT integration in teaching and learning in institutions of higher learning in Delta State, Nigeria.

### *1.2 Statement of the Problem*

Information and communication technology is an innovation that has been integrated into the education system of virtually all countries of the world including Nigeria. Highlighting the relevance of information and communication technology in this modern age, Ajayi (2002) rightly noted that any industry that sidelines ICT has simply signed a “death warrant” on its continued relevance. Therefore information and communication technology can be said to hold the key to continuity and sustainability of educational activities for success in schools. This new technology because of its constructivist student-centered approach is meant to supplement the traditional didactic approaches to learning by making learning more real and interesting. As a result of the roles of ICTs in promoting efficiency, World Bank (2002) recommended electronic networking of institutions involving e-mails, communication capacity for teaching, research, management and performance monitoring of systems. Casual observations through visits to some institutions of higher learning in Nigeria have shown that the traditional lecture method and use of textbooks is still the common practice. It appears the institutions lecturers and students are not yet aware of the benefits of ICTs in enhancing teaching and learning.

### *1.3 Research Questions*

The study provides answers to four questions as follows:

How do lecturers and students assess the availability of ICT for its integration in teaching and learning in institutions of higher learning in Delta State, Nigeria?

What are the benefits of ICT integration in teaching and learning?

What are the factors acting as barriers to ICT integration in teaching and learning in institutions of higher



technologies transform classrooms over the next 20 years (Ojedokun & Owolabi, 2003). ICTs utilization in teaching and learning can make classes more efficient, lectures more compelling, informative and varied and assignment more extensive, interesting and accessible and make discussions more challenging, making student's papers more original and researched (Bowers, 2003). Information and communication technologies facilitates effective interaction with students and lecturers as well as minimizes students attentiveness to instruction (Inije, 2012).

Previous studies suggest that incessant power failure in Nigeria was a serious impediment to the implementation of ICT integration in educational activities (Okebukola, 1990; Egunjobi, 2003; Asiyai, 2010). According to Onojetah (2012), inadequate ICT infrastructure, inadequate funding, acute shortage of manpower, lack of access to utilize ICT resources at will and non availability of computer laboratories are constraints to teaching ICT in education systems. Sinko (2002) identified the factors that acted as barriers to ICT effective integration in teaching and learning process as lacking support for the educational personnel and learners, lack of teachers competencies to use certain ICT soft ware, insufficient financing of teachers professional development in ICT and lack of appropriate computer hard ware and soft ware packages.

## **2. Methodology**

### *2.1 Design of the Study*

The study adopted the survey research design, of the ex-post facto type. It sought the opinion of the respondents on existing situation on ICTs integration in teaching and learning in institutions of higher learning in Delta State, Nigeria.

### *2.2 Population, Sample and Sampling Technique*

The population of the study comprised all the seven institutions of higher learning in Delta State during the 2011/2012 academic year. The sample of the study consisted of 560 (260 Lecturers and 300 students) drawn through the simple random sampling technique from four institutions of higher learning in the state. Only lecturer from the rank of lecturer two who have been lecturing since five years participated in the study, The breakdown of the sample for lecturers is Professor (n=32), Reader (n=48), Senior Lecturer (n=60), Lecturer One (n=60) and Lecturer Two (n=60). While only students in 300 (n=150) and 400 level (n=150) participated in the study.

### *2.3 The Instrument*

The only instrument for data collection from the respondents was structured questionnaire, divided into five sections. The first part contained demographic information of respondents including institution, gender and status. The second part contained 15 items structured on a five point likert-type scoring scale of Very Highly Available=5-point, Highly Available=4-point, Moderately Available=3-point, Barely Available=2-point and Not Available=1-point. The third, part contained 15 items which focused on the benefits of ICT integration in teaching and learning in higher education. The fourth section contained 13 items on the barriers to effective integration of ICT in teaching and learning in higher education. The fifth parts contained 12 items on the strategies for effective integration of ICT in teaching and learning in higher education. The items for sections 2, 3, 4 and 5 were each structured on a four point scoring scale of Strongly Agree SA=4-point, Agree A=3-point, Disagree D=2-point and Strongly Disagree SD=1-point.

### *2.4 Validation of the Instrument*

The instrument was validated by two experts in the faculty of education of Delta State University, Abraka who read through and made useful suggestions which was used to bear on the items before the final draft was prepared.

### *2.5 Reliability Determination*

The instrument was administered twice on 40 students and lecturers who did not participate in the original study within an interval of two weeks to ascertain its stability. Reliability coefficients of 0.76, 0.64, 0.60, 0.72, and 0.66 for section 2, 3, 4 and 5 respectively was computed via Pearson product moment formula.

### *2.6 Data Collection Procedure*

A team of four persons participated in data collection for this study. These are the researcher and three research assistants trained by her. The three research assistants were the researcher's students who live in the cities where the institutions of higher learning were situated. For ease of administration and retrieval of the instrument, the research assistants were assigned to the institution in the town where each resides. While the researcher collected data from her institution. Each person collected data from 140 respondents in each institution, assisted by staff of

the institutions. On the whole, 560 questionnaires were administered but 544 were retrieved valid and used for analysis of data. Descriptive statistics such as mean and standard deviation were employed in statistical analysis of data to answer the research questions. The cut-off point of 2.50 which is the mid-point of the scores was used as criterion mean value in making decision. Items with mean score from 2.50 and above were accepted while items with mean score below 2.50 were not accepted. The four hypotheses were tested using t-test of significant difference with the level of significance established at 0.05.

### 3. Results

The results of data analysis are presented in Tables 1-9.

Table 1. Respondents opinion about the availability of ICTs for use in teaching/learning

Subject	Groups	Not Available (%)	Barely Available (%)	Moderately Available (%)	Highly Available (%)	Very Highly Available (%)
ICTs	Lecturers	44.23	32.11	28.38	4.62	1.64
	Students	42.46	35.81	24.33	4.40	2.39

For Table 1, percentages are used to represent the availability of ICTs in institutions of higher learning in Delta state for use in teaching and learning. It is clear from the data in Table 1, that ICTs availability for their effective use in teaching and learning is low.

Table 2. Mean ratings and SD of respondents on the availability of ICTs for use in teaching/learning in institutions

ICTs Availability for teaching/learning	Lecturers Views		Students Views	
	Mean	SD	Mean	SD
Institutions have computerized library for staff and students use	2.25	0.98	2.28	1.60
Overhead projectors are available in lecture halls	1.28	1.44	1.02	1.28
Electronic bulletin boards are available	1.11	1.35	1.42	1.38
Multimedia technologies are available for use by students and lecturers	1.54	1.35	1.79	1.66
Institutions are connected with functional internet facilities for staff and students use	1.44	1.62	1.19	1.72
Offices of lecturers are automated with internet facilities	1.52	1.08	1.11	1.00
Students have access to computers in the department	1.95	1.01	1.09	1.22
Printing technology are available for students and lecturers use	1.34	1.65	1.29	1.47
Laboratories are automated with ICTs	1.18	1.00	1.06	1.23
Institutional cyber cafe are available for staff and students use	2.63	0.46	2.56	0.67
Electronic whiteboards are available in lecture halls and laboratories	2.23	1.04	1.20	0.88
Institutions have photocopiers for students and lecturers use	1.84	1.12	2.18	0.92
Digital recording equipment are available for students and lecturers use	1.58	0.84	2.30	0.66
Film and film projectors are available in lecture halls	1.09	1.80	1.21	1.52
Facilities for video conferencing is available for lecturers	1.29	1.45	1.30	1.18
Grand Mean/SD	1.62	1.21	1.53	1.22

From the data in Table 2, the mean score for all the items but one (institutional cyber café), fall below 2.50 the cut-off point. Thus generally, this clearly indicates that ICTs are not available for effective integration in

teaching and learning in institutions of higher learning in Delta state.

Table 3. Mean and standard deviation of respondents regarding the benefits of ICT integration in teaching and learning

Items on benefits of ICT integration in teaching/learning	Lecturers Views		Students Views	
	Mean	SD	Mean	SD
ICTs can help to expand access to information anytime	3.70	0.44	3.56	0.34
The use of ICTs can enhance fast covering of course content	3.40	0.67	3.25	0.62
ICTs when integrated in teaching/learning can help to Improve quality of instruction	3.46	0.80	3.62	0.42
ICTs can cater for different learning styles	3.00	0.71	3.44	0.76
Internet search can ease conduct of assignment	3.73	0.56	3.64	0.54
Students get bored with lesson when ICT is used	1.28	1.02	1.00	1.16
The use of ICTs can aid building of self knowledge	3.20	0.66	3.26	0.70
ICT application in learning can increase students involvement in learning	3.33	0.50	3.48	0.72
The use on ICTs can ease monitoring of performance	2.80	0.90	3.50	0.40
The use of ICT in teaching/learning may lead to reduced students attendance at lessons	1.42	1.20	1.23	1.00
ICTs can help to increase the opportunity for collaborative networking and research among colleagues	2.86	0.34	3.46	0.52
ICTs can aid codification of learning process	2.72	0.88	2.90	0.49
Learning environment becomes more stimulating with the use of ICTs	3.20	0.77	3.50	0.45
ICTs can enhance conceptual understanding	3.15	0.75	3.60	0.60
ICT can enhance effective management of large class size	2.72	0.96	3.20	0.46
Grand Mean/SD	2.93	0.73	3.10	0.61

For Table 3, the mean score for all the items except two items (ICTs can make students bored with lessons and the use of ICTs may lead to reduced students attendance at lessons) exceeded the critical mean value of 2.50. This implies that all the other items except the two items in parenthesis above, reflect the benefits of ICTs in teaching and learning in institutions of higher learning.

Table 4. Mean and SD of respondents' scores on the barriers to ICT integration in teaching and learning

Items	Lecturers		Students	
	Mean	SD	Mean	SD
Underfunding of ICT facilities/equipment can act as barrier to ICT integration to teaching/learning	2.90	0.55	3.45	0.38
Lack of ICTs in classrooms and laboratories can act as barrier to integration of ICT in teaching/learning in higher education	2.66	0.88	2.70	0.58
Government poor attitude towards ICT policy implementation can hinder effective integration of ICT in teaching/learning	2.78	0.90	3.00	0.55
Poor implementation of ICT policies by school administrators can hinder effective integration of ICT in teaching/learning in higher education	2.60	0.88	2.76	0.64
High cost of cyber café can hinder effective integration of ICT in teaching/learning	1.40	1.26	0.96	1.18
High cost of ICT equipment can impede effective integration of ICT in teaching/learning	2.69	0.89	2.80	0.45
Irregular power supply can hinder effective integration of ICT in teaching/learning	3.48	0.51	3.70	0.44
Anxiety in using ICT among students and lecturers can hinder effective integration of ICT in teaching/learning in higher education	2.68	0.92	2.80	0.70
Unwillingness to integrate ICT in teaching and learning by lecturers and students can hinder effective integration of ICT in teaching/learning	1.90	1.23	2.00	1.36
Low computer literacy among students and lecturers can hinder effective integration of ICT in teaching/learning	2.80	0.67	3.23	0.49
Limited access to ICT tools by students and lecturers can hinder effective integration of ICT in teaching/learning in higher education	2.95	0.60	2.74	0.56
Lack of computerized library inn schools for use by students and lecturers hindered effective integration of ICT in teaching/learning	2.63	0.77	2.58	0.45
Lack of ICT skilled personnel can hinder effective integration of ICT in teaching/learning in higher education	2.88	0.42	2.96	0.35
Grand Mean/SD	2.64	0.80	2.74	0.62

Table 4 shows that the mean score for all the items except the second and third items are below 2.50 the cut-off point indicating that all the items except the second and third represent the barriers to effective integration of ICT in teaching and learning in institutions of higher learning in the state. Therefore the barriers to ICT integration in teaching and learning in institutions of higher learning in Delta State, Nigeria are low computer literacy among students and lecturers, under funding of higher education, lack of access to ICT tools, lack of computerized libraries in schools, lack of ICTs in classrooms and laboratories, low power supply and anxiety in using ICT among students and lecturers.

Table 5. Mean and SD scores on strategies for effective integration of ICT in teaching and learning

Items on strategies for effective integration of ICT in teaching/learning in higher education	Lecturers		Students	
	Mean	SD	Mean	SD
Provision of electronic classrooms and laboratories well fitted with air conditioners	2.86	0.77	2.90	0.66
Provision of ICT skilled personnel by administrators of institutions of higher learning	3.44	0.78	3.30	0.38
Increased access to available ICTs by students and lecturers	3.50	0.42	3.65	0.48
Proper implementation of ICT policies by administrators of institutions of higher learning	2.82	0.70	3.00	0.81
Provision of pedagogic training on ICT for lecturers by administrators of institutions of higher learning	2.72	0.80	3.78	0.50
Provision of constant power supply	3.55	0.53	3.74	0.46
Provision of automated offices for lecturers by administrators of institutions of higher learning	3.00	0.99	3.80	0.48
Provision of computerized library by administrators of institutions of higher learning	2.78	0.84	2.84	0.80
Provision of functional internet connectivity in institutions by administrators of institutions of higher learning	3.65	0.45	3.76	0.42
Reorientation of students attitude towards ICT integration in higher education	2.70	0.90	3.31	0.66
Reorientation of lecturers attitude towards ICT integration in higher education	2.54	1.00	2.72	0.87
Reduction in cost of ICTs by government	3.47	0.55	3.31	0.72
Grand Mean/SD	3.08	0.73	3.34	0.60

For Table 5, the mean value for each of the item exceeded 2.50 the cut-off point. This indicates that all the items are strategies towards effective integration of ICTs in teaching and learning in institutions of higher learning in the state.

Hypothesis One: There is no significant difference between the mean ratings of lecturers and students on the level of ICTs availability for integration in teaching and learning.

Table 6. T-test showing difference in mean rating of students and lecturers on availability of ICTs for teaching/learning in higher education

Groups	N	Mean	SD	DF	t-Cal	t-Crit	Decision
Lecturers	256	1.618	1.213		1.23		NS
Students	288	1.535	1.225	542		1.960	

From Table 6, the calculated t-value is found to be not significant at  $df=542$  and 0.05 level of significance. Therefore the null hypothesis which states that there is no significant difference between the mean ratings of lecturers and students on the availability of ICTs for integration in teaching and learning was retained. The conclusion drawn is that lecturers and students did not differ significantly in their views on the availability of ICTs for use in teaching and learning in institutions of higher learning in the state.

Hypothesis Two: There is no significant difference between the mean ratings of lecturers and students on the benefits of ICTs integration in teaching and learning.

Table 7. T-test of difference between mean of lecturers and students on benefits of ICT integration in teaching/learning in higher education

Groups	N	Mean	SD	DF	t-Cal	t-Crit	Decision
Lecturers	256	2.93	0.73		1.08		NS
Students	288	3.10	0.61	542		1.960	

From Table 7, the calculated t-value of 1.08 is found to be not significant at  $df=542$  and 0.05 level of significance. Therefore the null hypothesis which states that there is no significant difference between the mean ratings of lecturers and students on the benefits of ICTs integration in teaching and learning was retained. The conclusion drawn is that lecturers and students did not differ significantly in their views on the benefits of ICTs integration in teaching and learning.

Hypothesis Three: There is no significant difference between the mean ratings of lecturers and students on the barriers to effective integration in teaching and learning.

Table 8. T-test of difference between mean of lecturers and students on barriers to ICT integration in teaching/learning in higher education

Groups	N	Mean	SD	DF	t-Cal	t-Crit	Decision
Lecturers	256	2.64	0.80		0.813		NS
Students	288	2.74	0.62	542		1.960	

From Table 8, the calculated t-value of 0.813 is found to be not significant at  $df=542$  and 0.05 level of significance. Therefore the null hypothesis which states that there is no significant difference between the mean ratings of lecturers and students on the barriers to effective integration of ICT in teaching and learning is upheld. The conclusion drawn is that lecturers and students did not differ significantly in their views on the factors acting as barriers to effective integration of ICT in teaching and learning.

Hypothesis Four: There is no significant difference between the mean ratings of lecturers and students on the strategies considered effective for integration of ICT in teaching and learning in higher education.

Table 9. T-test of difference between mean of lecturers and students on Identified strategies for effective integration of ICT in teaching/learning in higher education

Groups	N	Mean	SD	DF	t-Cal	t-Crit	Decision
Lecturers	256	3.08	0.73				NS
Students	288	3.34	0.60	542		1.960	

From Table 9, the calculated t-value of 1.438 is found to be not significant at  $df=542$  and 0.05 level of significance. Therefore the null hypothesis which states that there is no significant difference between the mean ratings of lecturers and students on the strategies considered effective for integration of ICT in teaching and learning in higher education is upheld. This implies that lecturers and students did not differ significantly in their views with respect to the strategies for effective integration of ICTs in teaching and learning in institutions of higher learning in the state.

#### 4. Discussion of Findings

The result of this study for research question one indicates that ICT availability for their effective integration in teaching and learning in institutions of higher learning used for this study is generally low although cyber café and ICT laboratories are available. Institutions of higher learning in the state have low level of availability of ICTs like internet connectivity, electronic lecture rooms and laboratories, electronic whiteboards and data projectors and office automation for lecturers. Earlier study by Asiyai (2010) on the role of ICT in the management of secondary education for sustainable development revealed that the need for provision of adequate ICT devices and the need to counter resistance to ICT among teachers, students and school

administrators were major challenges to effective use of information and communication technology in educational management. Additionally, the findings of this study on lack of ICT personnel, poor financing of ICTs and lack of ICT facilities corroborates that of Sinko (2002).

The result for research question two shows the benefits of ICT in education as expands access to information anytime, anywhere, enhances fast covering of course content and large class size, it can improve the quality of instruction, it caters for different learning styles and different categories of learners and eases the conduct of assignment and monitoring of performance. In addition, ICT in teaching and learning increases students' involvement in learning, increases opportunity for collaborative networking and research as well as enhancing the understanding of concepts. Students can learn more and better when they are involved in new situations that allows them to overcome challenges and when they are given opportunity to build something new in an active way. Information and communication technologies provide such opportunities for students. The finding is supported by Dede (1998) whose finding revealed that ICTs promote collaborative learning including role playing and group problem solving. Additionally, Nwosu (2003) seems to support the finding of this study by noting that ICT present itself as a versatile teaching and learning aid which undoubtedly leads to improved and efficient teaching and learning. Furthermore, Resnick (1998) noted that these new technologies make possible a learning revolution in education.

ICT is flexible and can be adapted to different learning styles. At anytime, anywhere, students and lecturers can network the website and download materials to support their teaching and learning processes. Such information like examination results, admission, recent journals and text books can be checked and downloaded anytime anywhere. In addition, researchers like Kozma (2005), Kulick (2003) and Webb and Cox (2004) observed that ICT when effectively integrated into a high quality environment can help deepen student's content knowledge, engage them in constructing their own knowledge and support the development of complex thinking skills.

For research question three, the result of this study shows that the factors acting as barriers to ICT integration in teaching and learning are lack of ICT in classrooms, low ICT literacy among lecturers and students, under funding of ICT facilities/equipment, irregular power supply, limited access to ICT tools and lack of computerized library. The finding on low ICT literacy among lecturers and students agrees with the finding of Farrel and Shafika (2007) they conducted a survey involving 52 countries and found that lack of required ICT skills among teachers hindered effective utilization of ICT in education in Africa. Similarly, the finding on computer anxiety and lack of computer literacy among lecturers and students is supported by Babalola (2009) whose report indicated that at the university of Ibadan Nigeria, majority of the teachers were apathetic towards interactive white boards while some complained that they needed to be trained on how to use these boards. Additionally, Okebukola (1990), Egunjobi (2003) and Asiyai (2010) revealed that irregular power supply in Nigeria was a serious impediment to ICT integration in education. The finding of this study generally portrays one obvious fact which is that epileptic power supply in Nigeria is a major barrier to ICT effective integration in teaching and learning in schools.

The result for research question four indicates that the strategies for effective integration of ICTs in teaching and learning in higher education are provision of electronic classrooms and laboratories well fitted with air conditioner and computerized libraries, increased access to available ICTs by students and lecturers, provision of electronic white boards in classrooms and laboratories, provision of ICT skilled personnel, proper implementation of ICT policies by school administrators, provision of functional internet connectivity in institutions, office automation for lecturers and provision of pedagogical training in ICT for lecturers and reorientation of students and lecturers attitude towards ICT. The finding on provision of pedagogical training in ICT for lecturers has the support of Light (2009) who noted that teachers need to be trained in ICT so that they would be able to structure their lessons and guide students ICT activities and select resources that support students learning. In addition, Reil and Fullan (1998) noted that integrating ICT in teaching and learning requires changes in teachers' knowledge, beliefs, and attitudes. This necessitates training in ICT so that the teacher can be able to shift from the traditional lecture method to ICT student centered learning.

The hypothesis testing for the four hypotheses indicates that lecturers and students did not differ significantly in each case. They had the same view in terms of availability of ICTs for use in teaching and learning, benefits of ICT integration in teaching and learning, identified barrier to effective integration of ICT in teaching and learning and the strategies considered effective for integration of ICT in teaching and learning in institutions of higher learning in Delta State, Nigeria.

## **5. Conclusion**

This study focused on ICT integration in teaching and learning in institutions of higher learning form students

and lecturers perspectives. The findings of the study showed that ICT integration in teaching and learning in higher education could help enhance efficiency in instructional delivery, increase students interest in learning, makes teaching students centered, enhance collaborative networking and thus enhance students' performance. The findings indicates that the most important factor acting as barrier to ICT effective integration in teaching and learning in higher education in Nigeria is irregular power supply, followed by underfunding of education and low ICT literacy among lecturers and students. In this era of globalization, students of institutions of higher learning in Delta State Nigeria may not be able to meet up with their peers and compete globally without adequate ICT skills. Information and communication technology have to be properly integrated in teaching and learning in higher education in Nigeria.

## 6. Recommendations

Based on the findings of the study the following have been recommended:

- (1) Nigerian government should give priority attention to ICT integration in education by assisting the state government in funding ICT diffusion in institutions to ensure that every department is networked.
- (2) Wealthy individuals, non-governmental organizations, community based organizations, and other agencies should collaborate with the state government in staff training on ICT to facilitate ICT full integration in teaching and learning. Staff training and development through seminars, conferences and workshops could help improve ICT literacy.
- (3) Institutions should adopt the establishment of solar energy sources to back up the power supply and thus enhance full integration of ICT in teaching and learning.
- (4) Administrators of institutions of higher learning should incorporate ICT into their strategic plan to ensure that they link the institution with Local Area Network (LAN).
- (5) Lecturers should update themselves with ICT literacy training through self help efforts by linking up with computer training institutes within the institution community to acquire knowledge and skills in ICT.

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