

## **Instructional technology in higher education: A case of selected universities in the Niger Delta**

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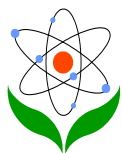
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Received 28 Feb., 2009

Revised 15 Dec., 2009



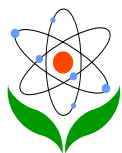
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## Abstract

This article examines the effectiveness of instructional technology in higher education institutions in relation to the role and usage of Information Communication Technology (ICT), its effectiveness in faculty teaching and its impact on student learning in universities in the Niger Delta of Nigeria. This study applied the Need Assessment Approach (NAA). A self-designed questionnaire, that employed benchmarks from similar studies conducted in the West, was used to collect data for this study. One hundred and twenty five (n = 125) respondents participated in the study. The results suggest that there are significant relationships between the impact of instructional technology, the usage of instructional technology and students' academic achievement. An absence of ICT instructional materials, ineffective policy implementation and a lack of other resources (infrastructures) to aid teaching and learning are responsible for short comings in the effective implementation of ICT in education. The study revealed that experience makes it easier to employ and exhibit greater proficiency when using ICT instructional material in the teaching and learning process. The findings and nature of this study bare implications for higher education administrators, faculty and researchers. By design, this research was based on a narrow field of literature and a small sample size. Consequently, it is recommended that further studies are based on a more widespread survey of literature and a larger sample size, which might also involve multiple case studies.

**Keywords:** Instructional technology, effectiveness, higher education, attitude and anxiety, universities, Niger Delta.

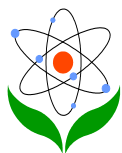


## Introduction

Education is a complex social undertaking, and there is no easy way to analyze the many dimensions of the policies involved. Nonetheless, we can begin with the simple characterization of higher education as a process involving the allocation and use of available resources to achieve certain instructional, social and/or economic objectives (Ololube, 2007). In most higher education circles in Nigeria, it is often observed that some institutions are undoubtedly better endowed than others in terms of, for example, the number, qualification and experience of the faculty and the availability of books and instructional technology materials (Ololube, 2008).

There are very few sectors of the Nigerian economy that have progressed beyond the emerging phase. It is estimated that 90% of Nigerian educational institutions are in the emerging phase, 7% in the applying phase, and 3% are in the infusing and transforming phases (Iloanusi & Osuagwu, 2009). The better endowed institutions tend to produce better results. Some faculties are simply more skillful than others. This result underlines the fact that, although substantial instructional resources may affect academic outcomes through their impact on the quality of the classroom environment, the interaction between faculty members and their students also plays an important role (Ololube, 2006a). Information and communication technology (ICT), when applied to education, enhances the delivery of and access to knowledge, and improves the quality of the curriculum. It produces richer learning outcomes when compared with ICT-poor education. ICT-enriched learning encourages critical thinking and offers a much broader spectrum of means for achieving educational goals (Iloanusi & Osuagwu, 2009).

While it has been rightly noted that instructional technology will not remedy all that is wrong with present-day education, there is no doubt that modern life is dominated by technology. As such there is universal recognition (Aduwa-Ogiegbaen & Iyamu, 2005; Ololube, 2008; UNESCO, 1998) of the need to use ICT in education as we enter a globalized era, in which the free flow of information via satellite and Internet sources considerably influences the global dissemination of knowledge to faculties and students. According to Iloanusi and Osuagwu (2009), the key thing is not the ICT per se, but, in understanding ICT and effectively employing it in the delivery of knowledge and in reaching goals in less time. In this way, ICT is used as a means but not as an end.



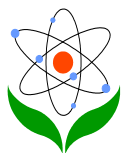
Computer technologies are perhaps the most fundamental information and communication technology tools in use today. With increasing pressure on higher educational institutions to “do more with less,” ICT can help to maintain or improve the quality of services in higher education while at the same time significantly reducing cost (Voss & Hadden, in Ololube, 2006b). Computer technologies include all removable media such as optical discs, disks, flash memories, video books, multimedia projectors, interactive electronic boards and continuously emerging state-of-the-art PCs (Iloanusi & Osuagwu, 2009).

Information technology (IT) is the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numeric information via the microelectronic-based combination of computer and telecommunication (Ololube, 2008). It is an encompassing field that covers texts handling, data storage and referencing, computer output on microform, document image processing, teletext/view data, telecommunication, e-mail, voicemail, networking, value-added network services, teleconferencing and videoconferencing and data transmission among others (Lucy, 2000; Williams, 2003). Despite intensive studies (Ifinedo, 2005; Ololube, 2008; Ololube & Egbezor, 2009; Ifinedo & Ololube, 2007) on the process, impact and decline of technology use in instructional teaching in IT disciplines, the lack of availability of technology laboratories for students and faculty in Nigerian higher education systems, and a limited instructional use of IT in teaching in general, an effective policy has not been put forward to remedy the situation.

### ***Purpose of the study***

This article aims

- To examine the effectiveness of instructional technology in higher education institutions in relation to the role and usage of ICTs, its effectiveness in faculty teaching and its impact on students academic achievements;
- To access factors that hinder the implementation and use of effective instructional technology and the impact of these factors on students' education;
- And to provide higher education faculty with confident recommendations on how to improve the quality of their teaching and learning.



### ***Research hypothesis***

The following research hypotheses were formulated to give direction to the study:

HO<sub>1</sub> : There are no significant relationships between the impact of instructional technology and usage of instructional technology and student academic achievement.

HO<sub>2</sub>: There are no significant differences between male and female attitudes and anxiety towards ICTs and their academic achievements.

HO<sub>3</sub>: There are no significant differences between the opinions of respondents in University 1 and University 2.

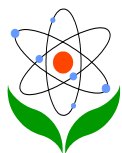
## **Literature review**

### ***Contextual education environmental in the Niger Delta***

The higher education academic scenery in the Niger Delta includes: teaching and learning, pedagogy, research methodology, dissemination and publication, libraries and information services, administration and management (Beebe, 2004). Many institutions of higher learning in the Niger Delta are not getting the job done and are in no particular hurry to redesign their programs so as to ensure improvements in curriculum, instruction and students' academic achievement (Ololube, 2008).

The challenges in the Niger Delta can be identified in relation to the geography of the region. Oil exploration and exploitation are intrinsically hostile to the people and the environment that surround resource-rich areas. While these problems are not insurmountable, they have been made worse by prolonged periods of neglect, marginalization, and cooperation and conspiracy between the state and multinational oil companies looking to exploit the resources of the region without a reciprocal plan to fully develop it (Thomas, 2001). The impacts of these underdevelopment tendencies are not difficult to detect as the education infrastructure is in a visibly poor condition — dilapidated buildings, chronically inadequate funding, a lack of ICT instructional materials and a lack of qualified ICT-literate faculty.

### ***ICT and higher education***

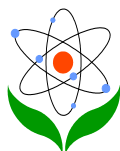


While we recognize that the use of instructional technology in the higher education teaching and learning processes is still in its infancy in Nigeria, ICT instructional use is vital to the progress and development of faculty and students alike. Higher education institutions, especially those in the West, have adopted ICT as a means to impart upon students the knowledge and skills demanded by 21st century educational advancement (UNESCO, 2002a). According to UNESCO (2002b), ICT now permeates the education environment and underpins the very success of 21st century education. ICT also adds value to the processes of learning and to the organization and management of learning institutions. Technologies are a driving force behind much of the development and innovation in both developed and developing countries. As such, all countries must seek to benefit from technological developments. To be able to do so, professionals (including faculty) have to be educated with sound ICT backgrounds, independent of specific computer platforms or software environments, to meet the required competencies of the ever-changing global environment.

When ICT in education does not achieve expected goals or when it introduces complicated educational reforms, students and teachers can lose focus on the essentials and become distracted by the rapidly changing technologies themselves. This result is likely when students and teachers have not been able to acquire a full understanding of the technologies, the role ICT plays and where, how and what technology to use. When the meaning of ICT and its unlimited potential in the educational arena are understood, rapidly changing technologies are not seen as overwhelming, but as enablers of greater critical thinking and problem solving in education (Iloanusi & Osuagwu, 2009).

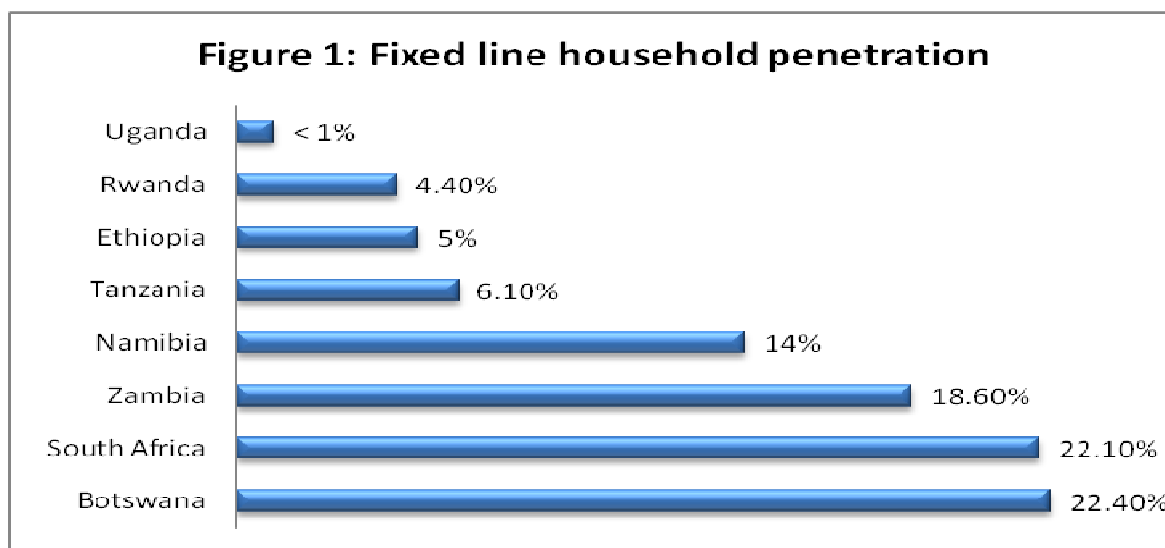
### ***Problems of ICT in nigerian higher education***

Despite the keenness of some institutions of higher learning to establish effective ICT education programs, they are confronted with enormous problems that may impede the proper implementation of these programs. The most significant of these is poor ICT penetration and usage among Nigerian higher education practitioners. Almost all African countries' basic ICT infrastructures are inadequate; a result of a lack of electricity to power the ICT materials and poor telecommunication facilities. Above all, this lack of access to much needed infrastructure is to the result of insufficient funds (Ololube, Ubogu & Egbezor, 2007). Several cities and rural areas in Nigeria still have fluctuation in their supply of electricity which makes the implementation of ICT in education most difficult. Additionally most Nigerian

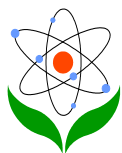


universities do not have access to basic instructional technology facilities, which also makes the integration of instructional technology in the delivery of quality education difficult.

Poor economic conditions and their effect on middle level manpower stand as a major barrier to the implementation of ICTs in higher education. Even an average middle income earner can not afford basic technological communication gadgets. Thus, computer related telecommunication facilities might not be overly useful for most Nigerian students and faculty members, as computers are still very much a luxury in institutions, offices and homes. This has made the integration of necessary on-line resources (e-mail, world-wide-web, etc.) into higher education most difficult (Ifinedo & Ololube, 2007). For example, in an African survey of ten countries (Gillwald & Esselaar, 2005), Botswana has the highest fixed line household penetration while Uganda trails far behind the rest, with penetration under 1%.



According to the Commonwealth of Learning International (2001), another serious challenge facing higher education in Nigeria is the need for integration of new ICT literacy knowledge into academic courses and programs. In this regard, professionals in Nigeria have not been able to benefit from international assistance, international networking and cooperation, or from courses, conferences and seminars abroad, because of lack of funding. This denial of assistance and absence of interaction has had adverse consequences, both on the psyche of faculty and on the implementation of the infrastructure necessary for professional development.



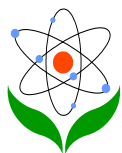
### *Progress and prospects*

Despite these conditions, optimism for the realization of Nigerian ICT and higher education goals remain; especially following China's launch of a communication satellite for Nigeria. This is the first for an African country and the first time China has provided both the satellite and the launch service. The Nigerian Communication Satellite (NIGCOMSAT – 1) is a super hybrid, geostationary satellite that will provide communication services for Africa, and parts of the Middle East and Southern Europe. Experts have predicted that the satellite will revolutionize telecommunications, create professional IT jobs and provide Internet access in remote villages. It is also expected to improve e-commerce and government efficiency by promoting the development of a digital economy in Nigeria and the rest of the African continent (Ololube, Ubogu & Egbezor, 2007). China's efforts represent a progressive move towards bridging the global digital divide, as there is no doubt that faculty and students in Nigeria would have much broader resources available to them were they to secure reliable access to the Internet.

Progress has also been made in terms of improving ICT penetration in university education in Nigeria. A 2009 survey of the online presence of 70 higher education institutions found that 46 Nigerian universities have an online presence whereas 24 are not online. The University of Jos, for example, has an online library (eGranary) and select infrastructure on campus to support basic forms of ICT integration in education. Some of the other university websites have online-learning portals with downloadable tutorials and provisions for online chatting; however, none support virtual classrooms, tele-conferencing and other synchronous forms of online-learning. Government departments, non-governmental organizations, financial institutions and individuals are all beginning to understand the need for these types of learning tools and have begin to fund ICT implementation in Nigerian educational institutions. Some of these organizations include the Nigerian Communications Commission (NCC) and Education Trust Funds (ETF) (Iloanusi & Osuagwu, 2009). Strategic plans and related projects that regularly revisit Nigerian ICT targets are ongoing.

The prospects for the use of ICT in teaching and learning in Nigerian higher education are positive, though there is much work left to be done. Aduwa-Ogiegbaen and Iyamu (2005) have observed that ICT enhances educational efficiency in general and that the efficiency of faculty teaching in Nigerian



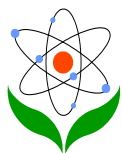


institutions stands to be improved. Many higher education faculty, for instance, are already teaching large classes of students using ICT materials. With enhanced ICT capabilities it would be possible to use carefully prepared ICT programs to ensure that learners are more accurately and systematically instructed using effective instructional technology.

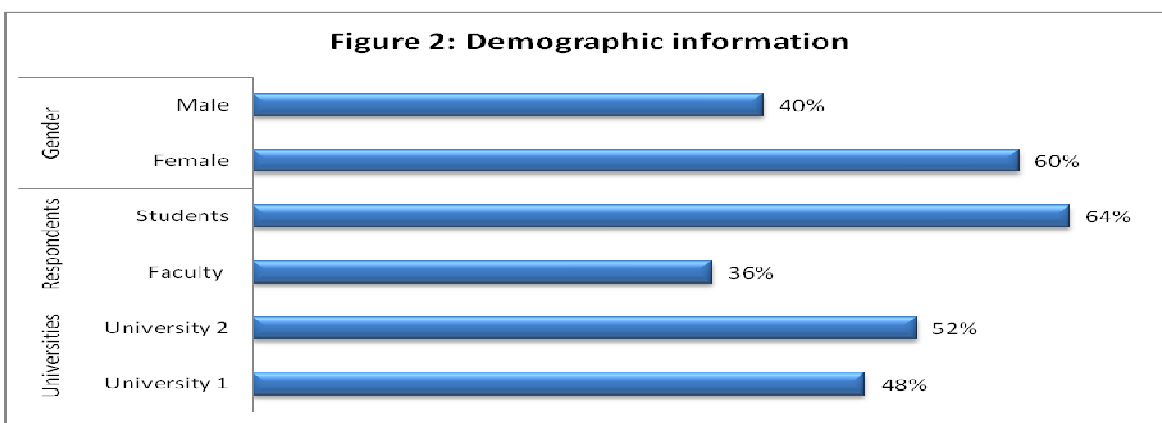
## Research line and procedures

This study applied the Need Assessment Approach (NAA). The NAA was used to determine if gaps exist in the current state of ICT in Nigeria, the causes of these gaps, the ideal implementation scenarios for ICT in higher education institutions and how to achieve these ideals. NAA is aimed at problem eradication or the amelioration of a gap where one exists. This approach measures the discrepancies between the current and desired result or the differences between the current situation and the ideal.

In this case, the Need Assessment Approach was used to examine the effectiveness of instructional technology in higher institutions in relation to the role and usage of ICTs, its effectiveness in faculty teaching and its impact on student learning in two Universities in the Niger Delta area of Nigeria. The two Universities were labeled University 1 and University 2. The assessment sought to ascertain the factors that hinder effective instructional technology implementation and its impact on students' educational achievement. The study also investigates faculty and undergraduate students' attitudes and anxiety about ICTs which includes the gender differentiations in their attitudes and anxiety. In this paradigm, attitudes involve the predisposition of a person to respond positively or negatively towards computers. Their computer-attitudes affect they do with the computer, reflects the experiences the user has had with technology, and is a determining factor of the user's future behavior towards computers. The user's computer attitude also provides the user with a framework within which to interpret the effect and the integration of computers in the user's life. Computer-related anxiety is a state of fear or tension of imminent contact with a computer that might be inconsistent with the actual danger presented to computer users. It has been associated with decreased use and worse, avoidance that can seriously affect some students' academic development. Computer anxiety, if untreated, can lead to complete ICT avoidance (Ololube, 2008).



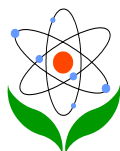
One hundred and twenty five ( $n = 125$ ) respondents participated in the study (60 [48%] from University 1 and 65 [52%] from University 2). Forty-five faculty (36%) and 80 students (64%) were randomly selected. The faculty was between 35 and 61 years of age, while the students were between 22 and 35 years old. Seventy-five (60%) were female, and 50 (40%) were male (see Figure 2). A self-designed questionnaire, that employed benchmarks from similar studies conducted in the West, was used to collect data for this study and the instrument was validated with the assistance of experienced faculty and university researchers. To further validate the instrument, a pre-test for this study was performed in the first three weeks, and responses from participants were used to make changes and modifications. The post-test was conducted in the last week of April 2008. The data collection instrument was made up of 25 items and employed a four point Likert-type scale response pattern. The scale consisted of: strongly agree, agree, disagree and strongly disagree. These answer options were weighted 4, 3, 2 and 1 respectively. The researchers conducted a Cronbach's alpha coefficient measurement to appraise the reliability of the research instrument, and the instrument was found to have a reliability coefficient of 0.843. The data collected was analyzed using simple percentages, t-test and chi-square of the Statistical Packages for Social Sciences (SPSS) version 17.



## Data analysis, results and discussion

### *Hypothesis 1*

Chi-square analysis was employed to test if significant relationships exist in respondents' opinions on the impact of instructional technology and students' academic achievements. The results of the chi-square analysis for the five variables



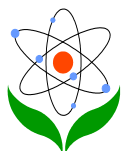
tested are as shown in Table 1. The table demonstrates that there are significant relationships between the impact of instructional technology, usage of instructional technology and students' academic achievement. Consequently, the null hypothesis is rejected. The findings of this study reveal that ICT, when applied to education, enhances effective knowledge delivery, enhances access to knowledge, produces richer learning outcomes, encourages effective critical thinking and generally improves the quality of teaching and learning. The results show that there is a positive and significant correlation between instructional technology and its effectiveness in augmenting educational offerings in higher education. The results thus confirm the observation made by Iloanusi and Osuagwu (2009) that ICT-aided teaching assists in effective delivery of knowledge and reaching educational goals in less time. However, Ololube (2008) and Ololube and Egbezor (2009) have argued that the diffusion of modern technology in teaching and learning depends on the degree to which a large segment of students and faculty have acquired the knowledge and skills required for the usage of ICT.

**Table 1: Effectiveness of instructional technology in higher education**

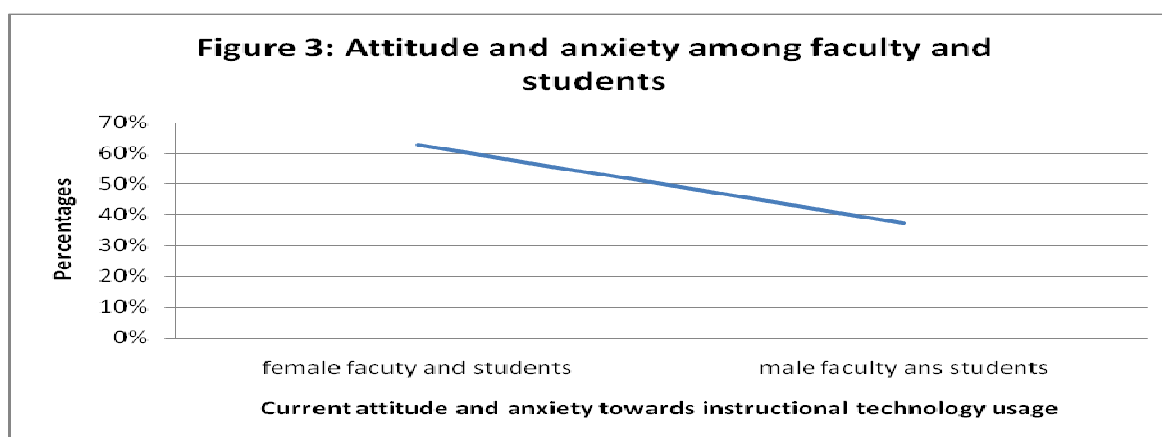
Variables	N	SD	Mean	X2	DF	Sig. (2-tailed)
ICT/Effective knowledge delivery	125	.69912	2.94400	27.080	3	.000
ICT/Access to knowledge	125	.83882	2.50400	33.375	3	.000
ICT/Produces effective learning outcome	125	.62238	3.08800	45.473	3	.000
ICT/Encourages critical thinking	125	.62816	3.02400	33.823	2	.000
ICT/Quality of teaching and learning	125	.71238	3.02400	37.460	3	.000

### ***Hypothesis 2***

The findings of this study also suggest that faculty and student attitudes and anxiety towards ICT in teaching and learning relate to prior experience received during early years of high school education. We recognize that these facilities were not available to many students from day one of their educational endeavors (kindergarten). This data is in line with the findings of Bebetsos and Antoniou (2008), who suggest a correlation (85.2%) between the unpleasantness of prior experience and current attitudes and anxiety toward ICT usage in instruction. The



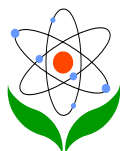
result shows a positive relationship between prior experience with ICTs and attitude and anxiety and support the documented slow rate of use and integration of ICTs amongst Nigerian faculty and higher education students. Faculty and students with early access to ICTs do not have significant technology phobias. In general, female faculty and students (63%) had more negative attitudes and greater anxiety than did male faculty and students (37%) (see Figure3). This is in line with the studies of Parasuraman and Igbaria, (1990), Agnetha Broos(2005) and Igbaria and Chakraborti (1990).



A t-test analysis was employed to test if there was a significant difference between female faculty/students and male faculty/students. The purpose of this analysis was to further verify the analytical information; the t-test analysis was aimed at determining if there are significant differences between respondents' means. The result shows that there are significant differences in male and female attitudes and anxiety towards ICTs across all the variables. SPSS version 17 displayed it as  $p < 0.000$  significance levels. This does not, however, mean that the probability is 0. It is less than  $p < 0.0005$ . The t-value for female was 35.12 while that for male was 39.29,  $Df = 124$ ,  $p < 0.000$  (see Table 2).

**Table 2: Two-tailed test of difference between female and male faculty and students**

Demographic Variables	SD.	Std. Error mean	T	Df	Sig. (2-tailed)
Female faculty and students	.87	.059	35.12	124	.000
male faculty and students	.67	.057	39.29	124	.000



More than 80% of respondents demonstrated lower academic achievement (amongst both faculty and students) when compared with their counterparts in the West where ITC usage and integration has existed for decades; the causes of this are not difficult to understand. A chronic absence of ICT instructional materials, ineffective policy implementation and a lack of other resources (infrastructure) to aid teaching and learning are responsible for the marked disparities. In essence, the study revealed that experience makes it easier to study with and exhibit greater proficiency when using ICT instructional material in the teaching and learning process.

### ***Hypothesis 3***

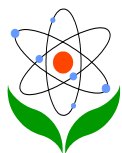
One-Way analysis of variance (ANOVA) set at  $p < 0.05$  was employed to test if significant differences exist in the opinions of the respondents from the two universities used for the study. The data obtained was computed and the results show that no significant differences exist in opinions across the two universities. (see table 3 for details)

***Table 3: Analysis of variance for universities***

Universities	Frequency	(%)	Mean	SD	F Ratio	Sig.
UNIVERSITY 1	61	48.8	1.9235	.654	1.59	.342
UNIVERSITY 2	64	51.2	2.0882	.671		

## **Concluding remarks**

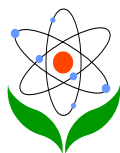
This article has examined the effectiveness of instructional technology in higher education institutions in relation to the role and usage of Information Communication Technologies (ICTs), its effectiveness in faculty teaching and its impact on student learning. It has also looked at attitudes and anxiety towards instructional technology amongst higher education faculty and students in a developing economy. Instructional technologies constitute an important force in the efforts to build an information technology society and to join the international community in meeting the millennium development goals. This study suggests that higher education worldwide is valuable in providing faculty and students with some of the resources needed for their continuing development; higher education



institutions are enduring entities that ensure and foster the diffusion of knowledge for national advancement. Society depends on institutions of higher education for growth, the production of new knowledge, the transmission of new knowledge through education, training and information and communication technology. As higher education is increasingly playing a role in the global free market we must endeavor to ensure standardization and uniformity in satisfying global trends, for example, in demanding excellence from our educational institutions in their training and preparation of highly qualified manpower. The Nigerian government must embark on a comprehensive program of higher education recapitalization and should move from its traditional position of paying lip service or little attention to empowering higher education programs to proactively funding, monitoring, and controlling ICT implementation as away of ensuring that standards are met (Ololube, 2008). This will necessarily involve making sure that adequate and functioning ICT infrastructures are available to private organizers of higher education programs and citizens at large. Such infrastructure includes electricity, telecommunications equipment and effective network systems (Yusuf, 2006).

According to Mac-Ikemenjima (2005), ICT plays a key role as an enabler that helps us to better manage the complex information flow and integrate such information in policy formulation in order to achieve the maximization of human capital and potential in society. Thus, ICT involves the development of effective and integrated tools as well as training modules to enable ICT application through effective teaching and learning.

Transferring technology to Nigeria and other Sub-Saharan African countries is necessary and overdue. An overhaul of the technology transfer process is essential, including stipulations for the acquisition of skills, knowledge and abilities. Although, these requirements appear daunting, especially in view of the human and material resources needed to successfully implement them, they are central to the development of the region. Over 70% of Nigeria's public universities and Nigerians themselves depend on the government to provide ICT materials in universities. This overwhelming dependence on the government has often left higher education institutions poorly equipped. ICT capacity building through the management of information systems and staff training are critical; and a failure to address these issues may lead to aims and objectives displacement, which in turn will allow higher education institutions to deviate from their primary role of teaching and research (Ololube, 2008).

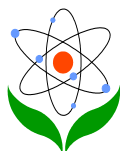


### ***Implication for research and practice***

This research suggests several possible implications for future research and practice. These implications pertain most directly to higher education institutions, faculty, students and researchers. At a management level, this case study calls for effective policies to make balanced investments and increase funding in higher education programs that will provide resources needed to effectively implement the use, integration and diffusion of ICT. Following the design of this investigation, which was based on a small sample size, the researchers suggest larger studies based on a more widespread survey, which may also involve multiple case studies. These limitations need to be considered when evaluating the findings of this study as they raise the possibility that some differences in opinion may be more a function of research design and contextual factors than a result of any differences in higher education studies. As with many other case studies, the findings should not be regarded as definitive but as offering faculty, educators, researchers, planners and administrators a view of the authors' reality.

## **References**

- Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. S. (2005). Using information and communication technology in secondary schools in Nigeria: Problems and prospects. *Educational Technology & Society*, 8(1), 104-112.
- Agnetha Broos, M. A. (2005). Gender and information and communication technologies (ICT) anxiety: Male self-assurance and female hesitation. *Cyber Psychology & Behavior*, 8(1), 21 -31.
- Bebetsos, E., & Antoniou, P. (2008). University students' differences on attitudes towards computer use. Comparison with students' attitudes towards physical activity. *Interactive Educational Multimedia*, 17. Retrieved December 10, 2009, from [http://greav.ub.edu/iem/index.php?journal=iem&page=article&op=view&path\[\]=130&path\[\]=198](http://greav.ub.edu/iem/index.php?journal=iem&page=article&op=view&path[]=130&path[]=198)
- Beebe, M. A. (2004). "Impact of ICT Revolution on the African academic landscape. CODESRIA conference on electronic publishing and dissemination", Dakar, Senegal 1 -2 September 2004. Retrieved 10 December 2009 from [http://www.codesria.org/Links/conferences/el\\_publ/beebe.pdf](http://www.codesria.org/Links/conferences/el_publ/beebe.pdf)
- Colle, R. D. (2005). Building ICT 4D capacity in and by African universities. *International Journal of Education and Development using Information and Communication Technology*, 1(1), 101-107.
- Commonwealth of Learning International (2001). *Building capacity to deliver distance education in Nigeria's Federal University System*. Report prepared for the World Bank.



- Retrieved April 20, 2008 from  
[http://siteresources.worldbank.org/NIGERIAEXTN/Resources/capacity\\_de.pdf](http://siteresources.worldbank.org/NIGERIAEXTN/Resources/capacity_de.pdf)
- Gillwald, A. & Esselaar, S. (2005). A Comparative Analysis of ICT Access and Usage in 10 African countries. Retrieved May 20, 2008 from  
[http://www.researchictafrica.net/images/upload/Chapter02new\(latest\).pdf](http://www.researchictafrica.net/images/upload/Chapter02new(latest).pdf)
- Ifinedo, P. & Oloolube, N. P. (2007). A Discourse on the problems, prospects, and progress of distance education in a developing country. In E. P. Bailey (Ed). *Focus on Distance Education Developments*. New York, NY: Nova Science Publishers. pp. 183-194.
- Ifinedo, P. (2005). Measuring Africa's e-readiness in the global networked economy: A nine-country data analysis. *International Journal of Education and Development using Information and Communication Technology*, 1(1), 53-71
- Igbaria, M. & Chakrabarti, A. (1990). Computer anxiety and attitudes towards microcomputer use. *Behavior and Information Technology*, 9(3), 229-241.
- Igwe, U. O. (2005). Harnessing information technology for the 21st Century: Library education in Nigeria. *Library Philosophy and Practice*, 7(2).
- Iloanusu, N. O. & Osuagwu, C. C. (2009). ICT in Education: Achievements so far in Nigeria. in A. Méndez-Vilas, A. Solano Martín, J. A. Mesa González and J. Mesa González (Eds). *Research, Reflections and Innovations in Integrating ICT in Education*. Badajoz: FORMATEX, pp.1331-1335. Retrieved December 1 2009, from  
<http://www.formatex.org/micte2009/book/1331-1335.pdf>
- Lucey, T. (2000). *Management Information Systems*. London: DP Publications.
- Mac-Ikemenjima, D. (2005). e-Education in Nigeria: Challenges and Prospects. Paper presentation at the 8th UN ICT Task Force Meeting April 13-15, 2005 Dublin, Ireland.
- Moja, T. (2000). *Nigeria Education Sector Analysis: An Analytical Synthesis of Performance and Main Issues*. WORLD BANK Report 2000.
- Oloolube N. P. (2006b). Appraising the relationship between ICT usage and integration and the standard of teacher education programs in a developing economy. *International Journal of Education and Development using Information and Communication Technology*, 2(3), 70-85.
- Oloolube, N. P. & Egbezor, D. E. (2009). Educational technology and flexible education in Nigeria: Meeting the need for effective teacher education. in S. Marshal, W. Kinthia & W. Taylor (Eds), *Bridging the Knowledge Divide: Educational technology for development*, pp. 391-413. Charlotte, NC: Information Age Publishing.
- Oloolube, N. P. (2006a). The impact of professional and non-professional teachers' ICT competencies in secondary schools in Nigeria, *Journal of Information Technology Impact*, 6(2), 101-118.
- Oloolube, N. P. (2007). The relationship between funding, ICT, selection processes, administration and planning and the standard of science teacher education in Nigeria.





*Asia-Pacific Forum on Science Learning and Teaching*, 8(1), Article 4. [Online]  
[http://www.ied.edu.hk/apfslt/v8\\_issue1/ololube/](http://www.ied.edu.hk/apfslt/v8_issue1/ololube/).

- Ololube, N. P. (2008) Computer communication and ICT attitude and anxiety among higher education students. In A. Cartelli, (Ed). *Encyclopedia of Information and Communication Technology*, pp.100-105. Hershey, PA: Idea Group Publishing.
- Ololube, N. P., Ubogu, A. E. & Egbezor, D. E. (2007). ICT and distance education programs in a Sub-Saharan African country: A theoretical perspective. *Journal of Information Technology Impact*, 7(3). 181-194.
- Parasuraman, S. & Igbaria, M. (1990). An examination of gender differences in the determinants of computer anxiety and attitudes toward microcomputers among managers. *International Journal of Man-Machine Studies*, 32(3), 327-340.
- Thomas, J. (2001). Women and the challenges of the Niger Delta. In Ozo-Eson, P. I. & Ukiwo, U. (Eds). *Challenges of the Niger Delta. In Proceeding of a Seminar on the Niger Delta*. Port Harcourt: Center for Advanced Social Science
- UNESCO (1998). "Harnessing Information Technology for Development in Africa". Retrieved 14/05/2006 from [www.unesco.org/education/educprog/Iwtf/doc/IAI.html](http://www.unesco.org/education/educprog/Iwtf/doc/IAI.html)
- UNESCO (2002a). *Information and Communication Technologies in Teacher Education: A Planning Guide*. Paris: UNESCO.
- UNESCO (2002b). *Information and Communication Technology in Education. A Curriculum for Schools and Programme for Teacher Development*. Division of Higher Education. (2002). Retrieved December 2, 2009, from <http://unesdoc.unesco.org/images/0012/001295/129538e.pdf>
- Williams, C. (2003). *The Integration of Information Technology (IT) in Our Schools Via The Needs Assessment Approach (NAA)*. Paper Presented at 2003 National Conference of Nigeria Association for Educational Media and Technology. Held at the University of Port Harcourt on the 4th-7th November 2003.
- Yusuf, M. O. (2005). Information and communication technologies and education: Analyzing the Nigerian national policy for information technology. *International Education Journal*, 6(3), 316-321.
- Yusuf, M. O. (2006). Problems and prospects of open and distance education in Nigeria. *Turkish Online Journal of Distance Education*, 7(1), 22-29.