A CONSULTING INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) TEACHER MODEL FOR TEACHING SECONDARY SCHOOL CURRICULUM

Adewole A.P[1], Akinwale, A. T[1] and Omokanye B.M[2]
[1] Computer Science Department, University of Agriculture Abeokuta, Ogun State.
[2] c/o International Livestock Research Institute, IITA Campus Oyo Road, Idi-Ose, Ibadan

Abstract
The use of ICTs in Nigeria and African countries generally is increasing and dramatically growing. However, while there is a great deal of knowledge about how ICTs are being used in developed countries, there is not much information on how ICTs are being used by teachers in developing countries. In this study a consulting information and communication technologies teacher model for teaching secondary school curriculum is proposed. The researchers designed questionnaires which were distributed to selected teachers in selected schools in Oyo sate of Nigeria. The questionnaire contained questions that allow researchers to know the present level of the usage of ICT in Nigerian secondary schools. The data collected were analyzed and graphical results were presented. For continuous uses of ICTs by teachers, it was recommended among others that teacher training and professional development oriented policies should support ICT-related teaching models that encourage both students and teachers to play an active role in teaching/learning activities.

Keywords:- *Curriculum, Information and communication Technology (ICT), Integration, Pedagogy, Teacher model, Technology*

Introduction

Information Communication and Technologies (ICTs) provide a window of opportunity for educational institutions and other organizations to harness and use technology to complement and support the teaching and learning process. E-learning is an example of the use of these ICT-supported teaching and learning methods whose use in educational institutions is gaining momentum with the passage of time (Omwenga etal, June 2004).

Educational systems around the world are under increasing pressure to use the new information and communication technologies (ICT) to teach students the knowledge and skills they need in the 21st century. Within the past decade, the new ICT tools have fundamentally changed the way people communicate and do business. They also have the potential to transform the nature of education: where and how learning takes place and the roles of students and teachers in the learning process.

Pelgrum and Law (2003) state that near the end of the 1980s, the term 'computers' was replaced by 'IT' (information technology) signifying a shift of focus from computing technology to the capacity to store and retrieve information. This was followed by the introduction of the term 'ICT' (information and communication technology) around 1992, when e-mail started to become available to the general public (Pelgrum and Law (2003). Reports have shown that ICTs cover Internet service provision, telecommunications equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centers, commercial information providers, network-based information services, and other related information and communication activities. According to another definition, ICTs are embedded in networks and services that affect the local and global accumulation and flows of public and private knowledge (Adeya, 2002). Moreover, Adeya (2002) mentions about a more simplified definition describing ICTs as an 'electronic means of capturing, processing, storing and disseminating information'.

The challenge confronting our educational systems is how to transform the curriculum and teaching-learning process to provide students with the skills to function effectively in this dynamic, information-rich, and continuously changing environment. ICTs provide an array of powerful tools that may help in transforming the present isolated, teacher-centred and text-bound classrooms into rich, student-focused, interactive knowledge environments. To meet

these challenges, learning institutions must embrace the new technologies and appropriate ICT tools for learning. They must also move towards the goal of transforming the traditional paradigm of learning.

Meanwhile, it is observed that some studies have been conducted on uses of ICTs by teachers particularly on the issue of their professional development. Most of these studies were carried out in developed countries where the use of ICTs has come of age, and where there are resources and material to maintain them. However, the use of ICTs by teachers in Nigeria is just beginning to gain popularity and researches in the area have just started emerging. Emphatically, the use of ICTs by teachers to teach the students is highly advantageous. This is because its enable them to demonstrate understanding of the opportunities and implications of the uses for learning and teaching in the curriculum context; plan, implement, and manage learning and teaching in open and flexible learning environment (UNESCO, 2004). In the light of these therefore, more research is needed to showcase further development of ICTs use by secondary school teachers in Nigeria, hence this research.

Methodology
Design
This study employed a descriptive survey method. This method was used to allow the researcher a vivid description of the integration of the study of ICT into the secondary school curriculum - A Consulting ICT Teacher Model.

Population and Sample
The population of this study comprised 26 private secondary school teachers and 14 public secondary school teachers in Ibadan, the capital of Oyo state Nigeria where the study was conducted. Three teachers were purposefully selected from each school. These gave a total of 120 teachers which consists of 75 males and 45 females. Their age ranged between 25 - 50 years with a mean age of 37.5 years.
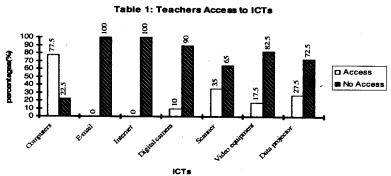
Instrument
A modified instrument tagged Teachers ICT use survey adapted from ICT survey indicator for teachers and staff by UNESCO (2004) and ICT Teachers Survey by New Zealand Ministry of Education MINEDU (1999) was used to gather data on the study. The instrument consists of two sections. The section 1 request the respondents' demographic information like age, sex, name of school, the class taught etc. The second section contains the research questions. Respondents were required to respond to items by ticking as applicable and likert type response format in which the respondents were to choose from strongly agree, agree, disagree, and strongly disagree.

Procedure
A modified instrument tagged Teachers ICT use survey adapted from ICT survey indicator for teachers and staff by UNESCO (2004) and ICT Teachers Survey by New Zealand Ministry of Education MINEDU (1999) were administered to all the 120 censured teachers in their respective schools with the permission granted by the various authorities of the schools.

Results and Evaluations

Research Question 1: Which ICTs do teachers have access to in their schools and what is the frequency of their access per week?
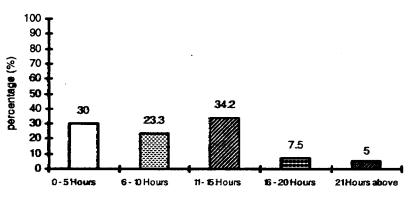

Table 1: Teachers Access to ICTs

Figure 1 above shows that 77.5% teachers who took part in the study indicate computer is the type of ICTs they have access to in their schools and 22.5% teachers have no access to computers.

Again 35.0% teachers indicate they have access to scanner and 65% teachers do not have access to it. It also shows that 17.5% teachers indicate they have access to video equipments and 82.5% teachers have no access to it. The figure also shows that 27.5% teachers indicate they have access to data projectors and 72.5% teachers have no access to it.

No teacher indicate having access to the Internet and e-mail. The result indicates that respondents have access to ICTs except that they do not have access to e-mail and the Internet this may be because their schools are not connected to internet and email.
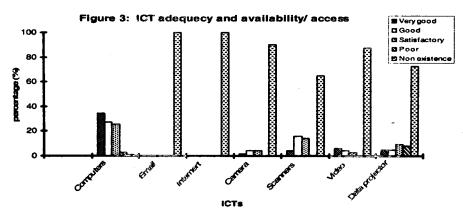
Figure 2: Teachers frequency access to ICT

hour of access (hr)

Figure 2 above shows that 34.2% teachers access ICTs in their schools between 11- 15 hours per week. The result also shows that 30.0% teachers access ICTs between 0 - 5 hours per week. Also reveals that 23.3% teachers access ICTs between 6 - 10 hours per week. 7.5% of the teachers access ICTs between 16 -20 hours and 5.0% teachers have

access to ICT above 21 hours in their schools. This indicates that teachers have access to ICT in their various schools only that variation exists in the frequency to which they access them.
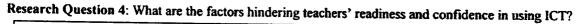
Research Question 3: What is the adequacy level of the various aspects of ICT availability/ access in respondents' schools?

Figure 3: ICT adequecy and availability/ access

Figure 3: shows that computer; camera, scanner, video and data projectors received higher rating of very good, good and satisfactory than ICT technical support, email and Internet access.
This indicates that technical support, email and Internet access are lacking. This may be due to non existence of the Internet, email and non availability of ICT technician in the country generally.

Research Question 4: What are the factors hindering teachers' readiness and confidence in using ICT?

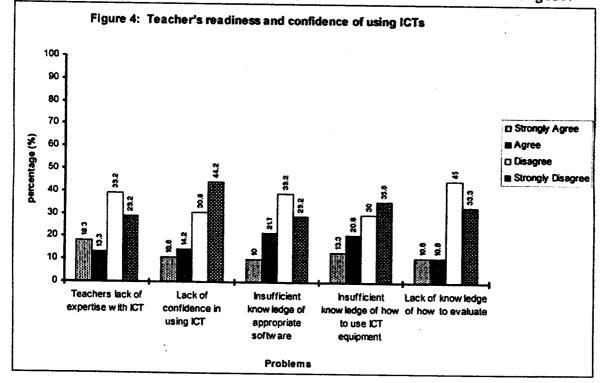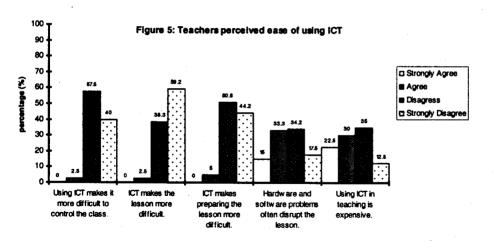Figure 4: Teacher's readiness and confidence of using ICTs

Figure 4: shows that 29.2% teachers strongly agree and 39.2% teachers agree that the lack of expertise is hindering the teachers' readiness and confidence in using ICT.

Furthermore, 33.3% teachers strongly disagree and 45.0% teachers disagree that lack of knowledge on how to evaluate the use and role play by ICT in the teaching and learning hinders learning. Again, result also shows that 35.8% teachers strongly disagree and 30.0% teachers disagree indicated insufficient knowledge of appropriate software as factor hindering the readiness of using ICT.

Research Question 5: What is the teachers' perception about the perceived ease of using ICT?

Figure 5: Teachers perceived ease of using ICT

Result in figure 5 shows that more teachers strongly disagree and disagree than those strongly agree and agree with the perception that using ICT makes it more difficult to control the class. In other words, the number of teachers who strongly disagree and disagree on all other items on perceived ease of using ICT is more than the numbers of those strongly agree and agree on the items. This means that the reverse is the case. That is to say that the teachers perceived ICT as very easier to use in teaching their lesson.

Research Question 6: What is the teachers perception about the perceive usefulness of ICT?

Table 1: Teachers perceived usefulness of ICT

Perceived usefulness items	Strongly Agree SA	Agree A	Disagree D	Strongly Disagree SD
Using ICT makes lesson more interesting.	55.0	42.5	2.5	-
Using ICT in my teaching is not enjoyable.	-	-	45.8	54.2
Using ICT makes lesson more fun.	55.8	44.2	-	-
Using ICT makes lesson more diverse.	39.2	61.7	9.2	-
Using ICT improves presentation of materials.	47.5	52.5	-	-
Using ICT makes lesson more difficult.	-	-	39.2	60.8
Using ICT reduces pupils' motivation.	1.7	7.5	44.2	47.5
Using ICT impairs pupils' learning.	2.5	3.3	46.7	47.5

The result in table 1 shows that more teachers strongly agree and Agree that using ICT make lesson more interesting, more fun, more diverse and improves presentation of materials than disagree and strongly disagree. Again, more teachers disagree and strongly disagree that using ICT in teaching is not enjoyable, more difficult, reduces pupils motivation and impairs pupils learning than strongly agree and Agree.

Schools from different location are to be linked to the Internet and at the same time have access to the main core in order to query, retrieve, and answer questions on the subject of their choice. Class work would also be given to students and marks with a feedback. The main core shall contain all subjects taught in the approved curriculum. Students from their various schools would station specialized teachers for each subject at the main core to answer questions. Also periodic update would be carried out on each subject whenever the curriculum is reviewed.
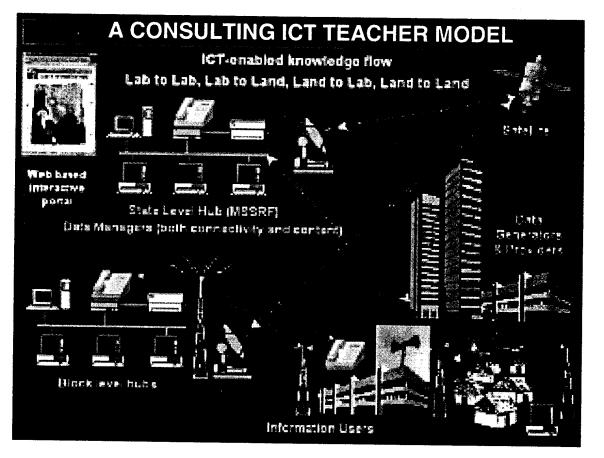
A CONSULTING ICT TEACHER MODEL

Figure 5: A Consulting ICT Teacher Model (Adapted from *Journal of Technology Education Vol. 17 No. 2, Spring 2006)*

Benefits Consulting ICT Teacher Model for teachers
- ICT allows teachers to engage and motivate pupils to a greater degree
- The Internet increases access to authentic data
- Simulations enable teachers to show experiments that would not otherwise be possible
- Data logging and digital video recording allow access to new sources of data in a wider range of experimental settings
- ICT provides quicker and more accurate data collection, saving lesson time and giving better quality results

Benefits for pupils
- The mechanical aspects of practical work are reduced, allowing pupils to concentrate on interpreting and analyzing data
- Visual modes of presentation aid understanding of concepts and processes
- Instant feedback enables pupils to refine experiments and hypotheses
- ICT can provide a greater capacity for project-based learning dealing with topics relevant to pupils' interests.
- There are more opportunities for independent, self-directed learning
- School networks and the internet can provide access to learning resources outside of school hours.
- Electronic communication enables pupils to become part of a community of learners.
- ICT provides opportunities for collaboration with peers and professional scientists .

Prospects for the use of ICT in teaching and learning
- can enhance educational efficiency
- can serve administrative functions
- can be used for individualized learning in secondary schools
- can change current pedagogical practices in secondary schools
- will offer the Nigeria teacher improvement in the techniques of research

Discussion of findings

On the issue of access to ICT in the respondents various schools, the result generally showed that aside of other identified ICTs, it's only the Internet and e-mail facilities that respondents didn't have access to. This is in agreement with the report by Gordon University Aberdeen, Scotland that teachers reported less use of the Internet and e-mail. This result may be due to the fact that these facilities are not available for access or perhaps the teachers lack the skills to access them. Moreover, some government considers providing Internet connectivity in schools as being expensive and difficult to maintain. However, providing Internet connectivity should not be seen in this way considering the plethora of information that can be accessed by the teachers and how this could be of immense help to facilitate knowledge delivery and students learning.

On frequency of access, the result generally shown that a considerable number of teachers access ICT between 11-15 hours per week. This is an indication that using ICT by the Nigeria secondary school teachers is relatively high. This corroborates the report that teachers came out positively with regards to the use of ICTs. It also confirms the assertion that availability usually determines access. If the ICTs are available, this will motivate the teachers to access them than when they are not available or available but not in sufficient quantity and quality. Similarly, factors which were found to be most important to teachers in their teaching which include: making the lessons more interesting, easier, more fun for them and their pupils, more diverse, more motivating for the pupils and more enjoyable were identified. Additionally, more personal factors were improving presentation of materials, allowing greater access to computers for personal use, giving more power to the teacher in the school, giving the teacher more prestige, making the teachers' administration more efficient and providing professional support through the Internet. All these may be responsible for the relatively high use of ICT by Nigeria teachers.

The study also shows that ICT technical support and Internet facility are lacking in all the respondents schools, while other facilities like hardware, software, computer consumable and other ICT equipment like digital camera and data projector are available. The report by Gordon University Aberdeen (2004) that teachers were reasonably confident in their use of ICT but felt that they needed much more in the way of support and professional development to maximize their use of ICT in the classroom support the present findings. The lack of ICT technical support therefore may be attributed to limited number of people who are professional in the use of ICT equipment's, couple with the fact that integration of ICT in the school curriculum in Nigeria and Africa generally has just begin. People just begin to develop interest in the area and take it as chosen field of study. It is assumed that at the passage of time more expert and ICT technician will begin to emerge. It should be noted that when planning introduction of new technology or when it is being used and implementing technical support or support services generally are very important. It is important to bear it in mind that it is not every user or every member of the social system where new technology is being used that have good knowledge of using the new technology. This is the more reason why support services need to be provided particularly for those who have less or no knowledge of the technology and how it works. Not this alone, the people with lesser knowledge or no knowledge at all will have the opportunity of being trained by the technical support staffs. This argument is in line with the step taken by the University of Botswana where e-learning has been introduced to complement teaching and learning. The e-learning support staffs are charged with the responsibilities of providing assistance to the tutors on how to teach their students through this medium and how to train those who do not have the knowledge of teaching through electronic medium. Courses were developed in categories and certificates are awarded based on the completion of each stage (Gachago and Mafote, 2007).

The finding that teacher's expertise and lack of knowledge to evaluate the use and role of ICT in teaching as the two prominent factors hindering teacher's readiness and confidence in using ICT support. Similarly, (JISC, 2004) in their study on developing maturity in learning technology revealed that the most significant barriers identified are linked to staff attitude and training staff in the use of ICT, access and ICT skill in general. Moreover (Marshall, Etal, 2003) reported similarly that staff continues to identify a lack of time as a barrier to the use of technology. While this has been interpreted to mean that staff have not have had the time to acquire the necessary skills in the

use of technology in teaching, it now seems more likely that it reflects a sense of priority conveyed by the institution and a desire by academics to see a return on the investment of their time in developing their teaching delivery with technology. Previous surveys of academic staff attitudes to the use of technology have also repeatedly identified time and an absence of such examples (e.g. skills and knowledge) as significant barriers to technology adoption (Marshall, 2000).

The perception of ICT as been easier to use by teachers in this study is also relevant to the findings by Cox et al. (1999). This is due to the fact that all factors teachers consider as making it easier to use ICTs was considered by Cox et al. as contributing to the continuous use of ICT by teachers in their study, and which were also found to be most important to these teachers in their teaching. The factors are: making the lessons more interesting, easier, more fun for them and their pupils, more diverse, more motivating for the pupils and more enjoyable among others.

Conclusions and Recommendations

There is no doubt that teachers and students in secondary schools in Nigeria will have incredible resources available if they have access to the Internet. By integrating information and communication technology into secondary school curriculum, a fundamental shift in the way teacher teaches and students learn will be evolved.

However, to integrate computer into teaching and learning in Nigeria, there must be proper and adequate funding and financing of education. Nigeria needs to invest heavily in the Internet business and create enabling environment for secondary school students to participate in downloading available and useful knowledge in the Internet. Secondary school students in Nigeria are already farther behind their peers in developed countries, thus widening the global   digital   divide.

It is worthy to note some of the limitations of this study. First, it is limited to secondary schools in Nigeria and secondly, the sample used in the study was drawn from a state out of the 36 states of Nigeria. In the light of these, future research should try and build on the limitations of this study by expanding its scope to cover more states. Effort should as well be made to compare ICT availability and use among teachers in private and government own secondary schools in the country.

References

Adeya, N. C. (2002) *"ICTs and Poverty: A Literature Review"* [Internet] UNESCO. Available from: < http://www.idrc.ca/en/ev-24718-201-1-DO_TOPIC.html > [Accessed 7 January 2006]

Cox, M.J., Preston, C., & Cox, K. (1999) What Motivates Teachers to use ICT? Paper presented at the British Educational Research Association Conference. Brighton. September.

Gachago, D., & Mafute, S. (2007).E-learning certificate at the University of Botswana. Available at: http://www.checkpoint-elearning.com/article/3935.html [Accessed 21 May 2007].

Gray, D.S. &. Souter, N. (2003).Secondary science teachers' use of, and attitude towards ICT in Scotland. A Report, University of Strathclyde, Glasgow, UK.

JISC. (2004).Developing maturity in e-learning. Available at: http://www.aclearn.net [Accessed 11 June   2007]

Marshall, S. (2000). Report on the 2000 UTDC Survey of Academic Staff Needs for Teaching Technology Support. Wellington NZ, Victoria University of Wellington

Marshall, S., Elgort, I., & Mitchell, G. (2003).Raising the Valleys: An Approach to Developing Staff Capability in e-Learning. Available at: http://surveys.canterbury.ac.nz/herdsa03/pdfsnon/N1123.pdf [Accessed 11 June 2007].

Omwenga, E., Waema, T., & Wagacha, P. (June 2004). A model for introducing and implementing e-learning for delivery of educational content within the African context. African Journal of Sciences and Technology 5(1) 35-48.

Pelgrum, W. J. and Law, N. (2003) *"ICT in Education around the World: Trends, Problems and Prospects"* UNESCO- International Institute for Educational Planning. [Internet] Available from: <http://www.worldcatlibraries.org/wcpa/ow/02d077080fcf3210a19afeb4da09e526.ht ml > [Accessed 17 January 2006] UNESCO, (2004). ICT pedagogy. UNESCO office.

Zhang, Y. (2005).Development and validation of an Internet use attitude scale. Computers and Education. Available at: http://www.sciencedirect.com/science {Accessed 10 February 2006}.