

Usage of ICT for instructional, managerial and personal purposes by science, technology and mathematics lecturers in the colleges of education in South-West Nigeria

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Abstract

The study examined the use of ICT for instructional, managerial and personal purposes by science, technology and mathematics lecturers in the colleges of education in South-West Nigeria. Also effects of the lecturers' years of experience, educational levels, age, opportunities of access to ICT and ways of learning to use ICT on purposes of ICT usage were determined. A survey design was adopted. The respondents for the study consisted of two hundred and fifty nine (259) lecturers. A questionnaire was used to collect data. Mean, standard deviation, analysis of variance and partial eta² were used to analyze the data collected. Results indicate that the purpose which ICT is most frequently deployed by the lecturers is for personal purpose while the least use is for instructional purpose. Years of experience, educational levels, age, opportunities of access to ICT have effects on the lecturers' usage of ICT for instructional and managerial purposes; while ways of learning to use ICT has effect on the lecturers' usage of ICT for instructional, managerial and personal purposes. Lecturers who have access to ICT both at home and at school use ICT for instructional and managerial purposes than those who rarely or do not have access to ICT and the lecturers who learn to use ICT at the university use ICT for instructional and managerial purposes than those who learn to use ICT through in-service training or through their own efforts. Consequently, the study recommended among others that science, technology and mathematics lecturers need to be re-sensitized on the use of ICT for instructional and managerial purposes; government and administrators of colleges of education should ensure that the content of in-service training programme on ICT usage should be re-designed and packaged to focus on training the lecturers for instructional and managerial purposes and ensure that the lecturers have access to ICT in the colleges of education

Key words: ICT, Science, Technology and Mathematics Lecturers, Purpose of ICTs usage, College of Education, Teacher Education.

Introduction

The 20th century witnessed a very significant technological advancement. Today, there is probably no aspect of human life that has not been affected by technological advancement. However, computer technology appears to be the most outstanding of all the 20th century technological inventions (Olaitan, 1996) and has greatly influenced technological development in other facets of human endeavour. The rapid and concomitant

developments in computer and computer-based technologies have contributed immensely to improvements in information and communication technologies (ICT). Information and communication technologies has become a key tool in acquiring, processing and disseminating knowledge and also an imperative tool for education and measuring development of a nation in the 21st century. According to United Nation Educational Scientific and Cultural Organization (UNESCO, 2002) educational systems around the world are under increasing pressure to use the new information and communication technologies to teach students the knowledge and skills they need in the 21st century.

The term, information and communication technologies refer to diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. According to Tinio (2002) these technologies include: broadcasting technologies (radio and television), video, digital versatile disk (DVD), telephone (both fixed line and mobile phones), satellite systems, computer and network hardware and software; as well as the equipment and services associated with these technologies, such as videoconferencing and electronics mail. The 21st century provides a plethora of opportunities on the platform of ICT waiting to be tapped and put to effective use in the teaching-learning context. ICT has the potentials to simplify and facilitate the quality of instructional processes in our schools. Cavas, Cavas, Karaoglan, and Kisla (2009) explained that ICT supports teaching and learning processes by providing new opportunities for interaction between students and knowledge; provides students easy access to information; offers the potential to meet the learning needs of individual students to promote equal opportunity, and also promote interdependence of learning among students. Additionally, ICT supports holistic learning, collaborative grouping, problem-oriented activities and integrated thematic units. Teachers wishing to teach in this way will be both more efficient and effective if they employ ICT to reach their goals (Dellit, 2002). To ensure science, technology and mathematics programs are relevant to the society, lecturers in the colleges of education must use these new technologies that are continually changing the ways people live, work, and learn to teach. Therefore, science technology and mathematics lecturers should keep pace with changing technology in order to assure their roles still relevant to produce tomorrow's teachers

Nigerian Government's Efforts towards Implementation of ICT in Schools

Successive Nigerian government recognizes the potentials of ICT in the school system. This is evidenced in the educational reform policies aimed at integrating the use of ICT in schools. The first national programme was the Federal Government 1988 policy document, National Policy on Computer Education (FME, 1988). The document emphasized the need for primary schools' pupils to be introduced to basic computer skills (Yusuf and Yusuf, 2009). This was followed by the release of ICT policy by Federal Government of Nigeria in the year 2000. According to Federal Government of Nigeria (FGN, 2000) the necessity for a national Information Technology (IT) policy became more obvious after the participation of the

Nigerian delegation in the first African Development Forum on the Challenge to Africa of Globalization in the Information Age held in Addis Ababa in October 1999. As a result, a national workshop on the National Information and Communication Infrastructure was held in Abuja in March 2000. The outcome was the production of a master plan for the development of a national ICT program “ICT 2000”. Some of the strategies of human resources development stated in the ICT policy are; Making the use of IT mandatory at all levels of educational institutions through adequate financial provision for tools and resources; and developing relevant IT curricula for the primary, secondary and tertiary institutions. One of the objectives of these strategies is to restructure the education system at all levels to respond effectively to the challenges and imagined impact of the information age.

Moreover, the Federal Government of Nigeria restructured the Petroleum Technology Development Fund (PTDF) to be a functional parastatal. Among other functions, PTDF was mandated by the Federal Government to establish ICT centers in universities, unity schools, polytechnics and colleges of education. Besides, several governmental and non-governmental organizations, banks and individuals have funded the implementation of ICT in Nigerian educational institutions at all levels. Couple with this, many of the educational institutions exerts their own efforts to making ICT equipment available. In view of the combined efforts of the government, schools and non-governmental organizations, most of the educational institutions including colleges of education have computers and other ICT equipment for teaching and administrative purposes.

The Need for ICT Usage for Teaching Science, Mathematics and Technology Education (STM) in the Colleges of Education

College of education is the foundation of all teacher education programs in Nigeria. According to Federal Government of Nigeria (FGN, 2004) the minimum qualification for entry into the teaching professional shall be Nigeria certificate in Education. The programs in the College of education lead to award of Nigeria Certificate in Education (NCE) to teachers who are expected to teach at the secondary school level. Most of the colleges of education in Nigeria have Departments of Science, Technology and Mathematics Education. The Science Education Department trains NCE teachers for science subjects such as physics, biology, and chemistry and computer science education. The Department of Technology Education trains technical teachers in automobile, building, electrical/electronics, wood and metal technology while, Mathematics Education Department trains mathematics teachers. The importance of science, technology education subjects and mathematics as the bedrock for any technological breakthrough cannot be overemphasized. The inter-relationship between mathematics, development and advancement of humans shows the importance of mathematics in life due to its numeral and symbolic nature. It is more related to the scientific and technological facets of man’s world (Maliki, Ngban, and Ibu, 2009). The basic skills underlying all scientific and technological skills are the control of the tools of

mathematics. The Nigerian quest for science and technological development demands that the teaching of the sciences, mathematics and technical courses should be in tune with the current teaching practices, particularly, to the pre-service teachers in the colleges of education who are expected to teach sciences, technology education subjects and mathematics in our secondary schools

As a result of rapid development in ICT, teacher training institutions worldwide are undergoing a rapid change in the structure, contents of their training and delivery methods of their courses. With ICT, the teaching profession is evolving from an emphasis on teacher-centred, lecture-based instruction to student-centred, interactive learning environments. Designing and implementing successful ICT-enabled teacher education programs are the keys to fundamental, wide-ranging educational reforms. For education to reap the full benefits of ICT in learning, it is essential that pre-service and in-service teachers are able to effectively use these new tools for learning. Teacher education institutions such as colleges of education need to provide the leadership for pre-service teachers and use the ICT tools for teaching and learning. In this context, UNESCO (2002) noted that, teacher education institutions need to develop strategies and plans to enhance the teaching-learning process within teacher education programmes and assure that all future teachers are well prepared to use the new tools for learning. It deemed necessary that lecturers teaching in the colleges of education in Nigeria use ICT effectively for teaching science, technology and mathematics in order to train teachers to meet the challenges of an information society once they graduate.

Instructional, Managerial and Personal Purposes of ICT Usage in the Colleges of Education in Nigeria

Literature is replete with ways teachers can use ICT in schools. Suen and Szabo (1998) identified usage of computer for teaching and personal purposes. Cavaş, Cavaş, Karaoglan, and Kisla (2009) categorized usage of ICT into instructional and managerial purposes, while Mumcu and Usluel (2010) identified instructional, managerial and personal purposes of ICT usage by teachers. Within this context, science, technology and mathematics lecturers in the colleges of education like any other teachers can use ICT for instructional, managerial and personal purposes. Instructional purpose involves usage of ICT for such activities like preparation for courses, searching the internet for course contents, making presentation in the class, carrying out laboratories experiments, preparation of electronic mail for sending course materials and lesson contents to students, preparation of internet/web-based devices for students to access and study course material online, video conferencing, use of wiki for students to collaborate on a group work, compile data and share results of research, use of mobile learning, blogs, blended learning and social networking tools such as twitter, yahoo, facebook, myspace etc. Managerial purpose involves use of ICT for preparation and storage of official correspondence, organizing students' grades and reports, and preparation of examination. While, personal purpose involves preparation of letters to friends, chatting

with friends, sending e-mail to friends, preparation and storage of personal information and files and surfing through the internet for fun. Making the use of ICT has become mandatory for teaching at all levels of educational institutions and particularly, for teacher preparation. According to UNESCO (2002) teacher education institutions may either assume a leadership role in the transformation of education or be left behind in the swirl of rapid technological change.

Moreover, teachers' personal characteristics such as, years of experience, educational levels, age, opportunities of access to ICT and ways of learning to use ICT have been found to impact on teachers ICT usage for teaching and learning. The effects of years of experience has been investigated in many studies (Isman, Yaratan and Caner, 2007; Mumcu and Usluel, 2010). Years of teaching experience has been consistently found to have effect on teachers' usage of ICT. Although, many studies indicate that there is no significant relationship between age and teachers usage of technology (Massoud, 1991; Woodrow, 1992; Handler, 1993). However, Mumcu and Usluel (2010) found a significant difference between age and teachers' use of ICT for instructional, managerial and personal purposes in vocational and technical secondary schools in Turkey. Isman, Yaratan and Caner (2007) revealed that younger teachers use computer more than the older teachers who teach science courses at elementary, middle and high schools in North Cyprus. Whereas, Mumcu and Usluel found a significant different for teacher's usage of ICT based on their level of education, Isman, Yaratan and Caner study indicates that there is no significant difference in teachers' responses about the use of computer on the teachers' level of education. Computer experience has been one of the common variables that affect teachers' usage of technology in schools (Woodrow, 1992; Smith, Caputi and Rawstorne, 2000; Yildirim, 2000; Gaudron & Vignoli 2002). Besides, Sahin and Thompson (2006) and Tella et al, (2007) found out that computer access is important for successful usage of computer for instructional purposes. Access to computer enhances teachers' competence and experience in the usage of computer.

Statement of the Problem

In spite of the huge investment on ICT by the successive Nigeria government aimed at improving teaching and learning in the colleges of education, research reports have shown that although, computers and other ICT equipment are generally available in schools, a substantial numbers of lecturers are either not using ICT in the school or the use of ICT is at low level. Study conducted by Tella (2011) revealed that there is low level usage of ICT by lecturers in south-west Nigeria colleges of education. Undoubtedly, this situation will hinder the development of competence for prospective teachers in using ICT to support instructional innovations, as they will teach in the way they were taught. Moreover, low level of ICT usage by lecturers in the south-west Nigeria colleges of education means that the lecturers are using ICT but are not making the best use of ICT as expected. Hence, what

is the purpose to which ICT is most frequently deployed by science, technology and mathematics lecturers in the south-west Nigeria colleges of education?

Besides, several studies had been conducted on ICT usage in education in Nigeria. Studies such as (Adeosun, 2010; Adeyemi and Olaleye, 2010; Ajayi, Ekundayo and Haastrup, 2009) focused on improvement of level of ICT resources in schools. Some other studies (Tella, Tella, Adika and Adeyinka, 2007; Adomi and Kpangba, 2010; Agbatogun, 2012) dwelled into improvement of teachers' pedagogies and practices with ICT; while, studies such as (Oyinloye 2008; Akinsola and Animashaun, 2007; Onasanya, Daramola and Asuquo (2006) determined the effects of computers on students' achievement in various subjects. The early studies in this field have ignored teachers' purposes of ICT usage in relation to teachers' variables, such as years of experience, educational levels, age, opportunities of access to ICT and ways of learning to use ICT. Perhaps, these variables have effects on lecturers' usage of ICT for instructional, managerial and personal purposes in the colleges of education in south-west Nigeria. To this end, what are the effects of science, technology and mathematics lecturers' years of experience, educational levels, age, opportunities of access to ICT and ways of learning to use ICT on purposes of ICT usage in the colleges of education in south-west Nigeria?

Purpose of the Study

This study sought to find out: (a) the purpose to which ICT is most frequently deployed by science, technology and mathematics lecturers in the south-west Nigeria colleges of education; (b) the effects of the lecturers' years of experience, educational levels, age, opportunities of access to ICT and ways of learning to use ICT on their purposes of ICT usage.

Research Questions

1. What is the purpose to which ICT is most frequently deployed by science, technology and mathematics lecturers in the south-west Nigeria colleges of education?
2. What are the effects of science, technology and mathematics lecturers' years of experience, educational levels, age, opportunities of access to ICT and ways of learning to use ICT on instructional, managerial and personal purposes of ICT usage?

Method

The research employed descriptive survey research design. Three hundred and forty (340) lecturers teaching sciences, technology and mathematics courses in the colleges of education in south-western Nigeria participated in this study. The instrument for data collection was a questionnaire designed for the study. The questionnaire had three sections A to C. Section 'A' sought information on personal data of the respondents such as age, years of experience, and qualification; section 'B', sought information on lecturers' usage of

ICT, access to ICT equipment and ways of learning to use the ICT. Section 'C', sought information on lecturers' instructional, managerial and personal usage of ICT. The items of section C were structured on a four point rating scale of mostly used (MU); sometimes Use (Su); rarely use (Ru) and never use (NU). These response categories were assigned numerical values of 4, 3, 2, and 1 respectively. The questionnaire was subjected to face and content validation by three experts. The internal consistency of the instruments was determined using Cronbach Alpha. The instrument was administered on ten (10) lecturers in colleges of education in north/central Nigeria. The reliability coefficient for section C- $\alpha = .88$. The instrument was administered to the respondents through research assistants, and personal contact. Out of 340 questionnaires administered, 259 were duly filled and returned by the respondents. These represented 86.33% rate of return. Mean, standard deviation, analysis of variance and partial eta² (η^2) coefficient were used for data analysis.

Results

Research Question 1

- What is the purpose to which ICT is most frequently deployed by science, technology and mathematics lecturers in the south-west Nigeria colleges of education?

Table 1

*Mean Ratings of Science, Technology and Mathematics Lecturers' responses on the purpose to which ICT is most frequently Deployed in the Colleges of Education in South-West Nigeria
N=259*

Purpose of ICT Usage	Lecturers' Designation	Mean	Overall Mean
		\bar{X}	\bar{X}
Instructional	Science Lecturers	1.45	
	Technology Lecturers	1.43	1.44
	Mathematics Lecturers	1.44	
Managerial	Science Lecturers	1.85	
	Technology Lecturers	1.82	1.84
	Mathematics Lecturers	1.85	
Personal	Science Lecturers	3.45	
	Technology Lecturers	3.58	3.47
	Mathematics Lecturers	3.39	

Table 1 shows that the purpose to which ICT is most frequently deployed by Science, Mathematics and Technology lecturers in the colleges of education in south-west Nigeria is for personal purpose ($\bar{X} = 3.41$), followed by managerial purpose ($\bar{X} = 1.84$, while the least use to which ICT is being deployed by the lecturers is instructional purpose ($\bar{X} = 1.44$).

Research Question 2

What are the effects of science, technology and mathematics lecturers' years of experience, educational levels, age, opportunities of access to ICT and ways of learning to use ICT on instructional, managerial and personal purposes of ICT Usage?

Effects of Science, Technology and Mathematics Lecturers' Years of Experience on their Purposes of ICT Usage

Table 2

One-way Analysis of Variance Results Showing Comparison of ICT Usage Means by Years of Experience

Purpose of ICT Usage	Years of Experience	\bar{X}	SD	F	Sig of F	Scheffe	Partial eta ²
Instructional	1-5 ⁽¹⁾	1.62	0.42	6.07*	0.000	0.087	1**
	6-10 ⁽²⁾	1.44	0.19				
	11-15 ⁽³⁾	1.42	0.15				
	16-20 ⁽⁴⁾	1.40	0.20				
	20 & above ⁽⁵⁾	1.40	0.19				
Managerial	1-5 ⁽¹⁾	2.04	0.34	10.43*	0.000	0.141	1**
	6-10 ⁽²⁾	1.85	1.88				
	11-15 ⁽³⁾	1.82	0.16				
	16-20 ⁽⁴⁾	1.79	0.17				
	20 & above ⁽⁵⁾	1.80	0.16				
Personal	1-5 ⁽¹⁾	3.45	0.56	1.63	0.165		
	6-10 ⁽²⁾	3.39	0.56				
	11-15 ⁽³⁾	3.40	0.53				
	16-20 ⁽⁴⁾	3.61	0.57				
	20 & above ⁽⁵⁾	3.50	0.49				

* Significant at .05 level

** The mean difference is significant at the .05 level.

The data presented in Table 2 show that a significant difference at .05 level of significance between years of experience and STM lecturers' usage of ICT for instructional purpose ($F=6.07$ and sig of $F=0.0000$) and managerial purposes ($F= 10.43$ with Sig of $F = 0.000$). However, there exists no significant difference between years of experience and STM lecturers' usage of ICT for personal purpose ($F=1.63$ with Sig of F stood at 0.165). This reveal that, years of experience of STM lecturers' has effect on usage of ICT for Instructional and managerial purposes. Scheffe test was used to determine in which of the groups the mean difference exist. Result of the Scheffe test shows that the difference is in favour of lecturers with 1-5 years of experience.

The effect size of years of experience on ICT usage as measured by Eta coefficient (η^2) are; 8.7 percent on instructional purposes, 14 percent on managerial purposes. Hence, years of experience has greatest effect on the use of ICT for managerial purposes.

Effects of Science, Technology and Mathematics Lecturers' Educational Level on their Purposes of ICT Usage

Table 3

One-way Analysis of Variance Results Showing Comparison of ICT Usage Means by Educational Level

Purpose of ICT Usage	Educational level	\bar{X}	SD	F	P	Scheffe	Partial eta ²
Instructional	B.Sc/B.Ed ⁽¹⁾	1.23	0.18			1**	
	M.Sc/M.Ed ⁽²⁾	1.45	0.25	4.05*	0.019		0.031
	Ph.D ⁽³⁾	1.45	0.20				
Managerial	B.Sc/B.Ed ⁽¹⁾	1.68	0.09			1**	
	M.Sc/M.Ed ⁽²⁾	1.85	0.16	3.09	0.047		0.024
	Ph.D ⁽³⁾	1.85	0.02				
Personal	B.Sc/B.Ed ⁽¹⁾	3.46	0.74				
	M.Sc/M.Ed ⁽²⁾	3.50	0.54	0.70	0.06		
	Ph.D ⁽³⁾	3.41	0.55				

* Significant at .05 level

** The mean difference is significant at the .05 level.

There is a significant difference at .05 level of significance between educational level of STM lecturers and their usage of ICT for instructional purpose ($F = 4.05$ and Sig of $F = 0.019$) and managerial purpose ($F = 3.09$ and Sig of $F = 0.047$). Meanwhile, there is no significant difference between educational level of STM lecturers and usage of ICT for personal purpose ($F = 0.70$, Sig of $F = 0.06$). Therefore, the educational level has effect on usage of ICT for Instructional and Managerial purposes. Scheffe test indicates that the difference in mean is between lecturers with B.Sc/B.Ed and their colleagues with higher educational levels (M.Sc/M.Ed and Ph.D). The difference is in favour of lecturers with higher educational levels.

The effect size of educational level on ICT usage as measured by Eta coefficient (η^2): 3.1 percent on instructional purpose, and 2 percent on managerial purpose. This result indicates that educational level has the greatest effect on the use of ICT for instructional purposes.

Effects of Science, Technology and Mathematics Lecturers' Age on their Purposes of ICT Usage

Table 4

One-way Analysis of Variance Results Showing Comparison of ICT Usage Means by Age

Purpose of ICT Usage	Age Groups	\bar{X}	SD	F	P	Scheffe	Partial eta ²
Instructional	20-29 ⁽¹⁾	1.46	0.45			2**	
	30-39 ⁽²⁾	1.61	0.36				
	40-49 ⁽³⁾	1.43	0.20	5.88*	0.000		0.085
	50-59 ⁽⁴⁾	1.43	0.18				
	60 & Above ⁽⁵⁾	1.36	0.19				
Managerial	20-29 ⁽¹⁾	1.87	0.48			2**	
	30-39 ⁽²⁾	2.03	0.28	8.89*	0.000		0.123
	40-49 ⁽³⁾	1.83	0.17				
	50-59 ⁽⁴⁾	1.82	0.17				
	60 & Above ⁽⁵⁾	1.76	0.17				
Personal	20-29 ⁽¹⁾	3.22	0.80				
	30-39 ⁽²⁾	3.50	0.56	1.09	0.35		
	40-49 ⁽³⁾	3.55	0.54				
	50-59 ⁽⁴⁾	3.40	0.52				
	60 & Above ⁽⁵⁾	3.47	0.62				

*Significant at .05 level

** The mean difference is significant at the .05 level.

There is a significant difference at .05 level of significance between age of STM lecturers and usage of ICT for instructional purpose ($F = 5.88$ and Sig of $F = 0.000$) and managerial purpose ($F = 8.89$ and Sig of $F = 0.00$). There is no significant difference between the lecturers' age and their usage of ICT for personal purpose ($F = 1.09$, Sig of $F = 0.35$). This shows that the lecturers' age has effect on their usage of ICT for Instructional and Managerial purposes. Scheffe test indicates that the difference in mean is in favour of lecturers with 30-39 years of age.

The effect size of age on ICT usage as measured by Eta coefficient (η^2): 8.5 percent on instructional purpose, and 12 percent on managerial purpose. This result indicates that age has the greatest effect on the use of ICT for managerial purposes.

Effects of Science, Technology and Mathematics Lecturers' Opportunities of Access to ICT on their Purposes of ICT Usage

Table 5

One-way Analysis of Variance Results Showing Comparison of ICT Usage Means by opportunities of Access to ICT

Purpose of ICT Usage	Opportunity of Access to ICT	\bar{X}	SD	F	P	Scheffe	Partial eta ²
Instructional	I have access to ICT at home and at school ⁽¹⁾	1.64	0.26	5.08*	0.009	1**	0.248
	I rarely have access to ICT ⁽²⁾	1.21	0.18				
	I do not have access to ICT ⁽³⁾	1.19	0.16				
Managerial	I have access to ICT at home and at school ⁽¹⁾	1.86	0.22	4.60*	0.002	1**	0.112
	I rarely have access to ICT ⁽²⁾	1.11	0.19				
	I do not have access to ICT ⁽³⁾	1.10	0.12				
Personal	I have access to ICT at home and at school ⁽¹⁾	3.46	0.55	0.24	0.785	.	
	I rarely have access to ICT ⁽²⁾	3.51	0.58				
	I do not have access to ICT ⁽³⁾	3.43	0.49				

* Significant at .05 level

** The mean difference is significant at the .05 level.

There is a significant difference at .05 level of significance between STM lecturers' opportunities of access to ICT and usage of ICT for instructional purpose ($F = 5.08$ and Sig of $F = 0.009$) and managerial purpose ($F = 4.60$ and Sig of $F = 0.002$). However, there is no significant difference between STM lecturers' opportunities of access to ICT and usage of ICT for personal purpose ($F = 0.24$, Sig of $F = 0.785$). This shows that opportunity of access to ICT has effect on usage of ICT for Instructional and Managerial purposes. Scheffe test indicates that the significant difference is in favour of lecturers who have access to ICT at home and at school.

The effect size of opportunities of access to ICT on usage of ICT as measured by Eta coefficient (η^2): 24 percent on instructional purpose, 11 percent on managerial purpose. The

results show that opportunity of access to ICT has the greatest effect on the use of ICT for instructional purpose.

Effects of Science, Technology and Mathematics Lecturers' Ways of Learning to Use ICT on their Purposes of ICT Usage

Table 6

One-way Analysis of Variance Results Showing Comparison of ICT Usage by Means of Ways of Learning to Use ICT

Purpose of Use	Ways of Learning to Use ICT	\bar{X}	SD	F	P	Scheffe	Partial eta ²
Instructional	Through In-service Training ⁽¹⁾	1.21	0.18			3**	
	Through Own effort ⁽²⁾	1.43	0.20	3.08*	0.018		0.203
	At the University ⁽³⁾	1.50	0.32				
Managerial	Through In-service Training ⁽¹⁾	1.32	0.17			3**	
	Through Own effort ⁽²⁾	1.86	0.19	2.66*	0.011		0.103
	At the University ⁽³⁾	1.88	0.27				
Personal	Through In-service Training ⁽¹⁾	3.49	0.54			3**	
	Through Own effort ⁽²⁾	3.74	0.43	4.87*	0.008		0.037
	At the University ⁽³⁾	3.36	0.59				

* Significant at .05 level

** The mean difference is significant at the .05 level.

There is a significant difference at .05 level of significance between STM lecturers' ways of learning to use ICT and usage of ICT for instructional purpose ($F = 3.08$, Sig of $F = 0.018$), managerial purpose ($F = 2.66$, Sig of $F = 0.011$) and personal purpose ($F = 4.87$, Sig of $F = 0.008$). This shows that ways of learning to use ICT has effect on usage of ICT for instructional, managerial and personal purposes. Scheffe test indicates that the significant difference is in favour of lecturers who learn to use ICT at university

The effect size of ways of learning to use ICT on usage of ICT as measured by Eta coefficient (η^2): 20 percent on instructional purpose, 10 percent on managerial purpose and 3 percent on personal purpose. The results show that ways of learning to use ICT has the greatest effect on the use of ICT for instructional purpose.

Discussion of Findings

Science Technology and Mathematics (STM) lecturers in the colleges of education in south-west Nigeria use ICT most frequently for personal purpose, followed by managerial purpose and the least for instructional purpose. This finding is different from the finding of Mumcu and Ushuel (2010) which revealed that technical and vocational teachers in Turkey use ICT most frequently for managerial purpose, and the least for instructional purpose. This finding shows that science, technology and mathematics lecturers in the colleges of education in south-west Nigeria use ICT mostly to check and send e-mail to friends as well as to prepare letters to friends, chat with friends, prepare and store personal information and files and surf through the internet for fun

Findings from this study revealed that years of experience has no effect on STM lecturers' usage of ICT for personal purpose. However, statistically significant difference between years of experience and STM lecturers' usage of ICT was found for instructional and managerial purposes. The mean difference was also found to be in favour of lecturers with lower years of experience. Thus, lecturers with lower years of experience use ICT than their colleagues with higher years of experience for instructional and managerial purposes. Isman, Yaratan and Caner (2002) in their study disclose that teachers who have an experience of 10 years or less agree more to use of technology tools than those teachers who have an experience of 11 years or more.

This study revealed that educational level of the lecturers has no effect on their usage of ICT for personal purpose. Meanwhile, statistical significant difference was found between educational level of STM lecturers and usage of ICT for instructional and managerial purposes, in favour of lecturers with higher educational levels (M.Sc/M.Ed and PhD). This finding indicates that educational level has effect on usage of ICT for Instructional and Managerial purposes. There are no consistent results on relations between teachers' usage of ICT and their levels of education. Mumcu and Usluel (2010) found a significant different for vocational and technical teacher's usage of ICT based on their level of education in Turkey. However, Isman, et al. (2002) found no significant difference in science teachers' responses about the use of computer on the teachers' level of education at elementary, middle and high schools in North Cyprus.

ICT access is important for the successful use of ICT for instructional purpose (Sahin and Thompson, 2006; Tella et al, 2007). The result of this study showed statistically significant difference between opportunities of access to ICT and STM lecturers' usage of ICT for instructional and managerial purposes. The significant difference is in favour of lecturers who have access to ICT at home/school.

Finding from this study revealed a statistically significant difference between ways of learning to use ICT and STM lecturers' usage of ICT for instructional, managerial, and personal purposes. The difference is in favour of lecturers who learn to use ICT at university. The obvious implication of this finding is that learning to use ICT at the university makes

colleges of education lecturers appreciate use ICT more for instructional, managerial and personal purposes than those who learn to use ICT through their own efforts or through in-service training. This finding can be explained from the viewpoint that when ICT is learnt at the university level, it gives lecturers ample opportunities to improve his/her proficiency over a period of time. In addition, when it is learnt at that stage, it tends to become an integral part of a person as compared to when one has to learn it probably for some induced reasons.

Conclusions and Recommendations

The findings of this study have shown that ICT is least used for instructional purpose which is at the core of teaching and learning. The study also revealed that lecturers are using ICT mostly for personal purpose. This means that ICT has not been fully integrated in the teaching of science, technology and mathematics education to pre-service teachers in the colleges of education in south-west Nigeria. In this way, science, technology and mathematics education teachers trained in the colleges of education will not be able to meet up with the challenges of information society once they graduate. In this regard, the lecturers need re-sensitization on the use ICT for instructional and managerial purposes in the colleges. Therefore, in-service training focusing on usage of ICT for instructional and managerial purposes needs to be organized for the lecturers.

The results of the analysis have also revealed that years of experience, educational level and age have no effects on STM lecturers' usage of ICT for personal purpose. However, years of experience, educational level and age were found to have effects on the lecturers' usage of ICT for instructional and managerial purposes. It is seen that, the difference in mean is in favour of lecturers with lower years of experience. The result shows that the higher the years of experience, the lower the usage of ICT for instructional and managerial purposes. Hence, teachers with higher years of experience need to be re-sensitized on the need to use ICT for instructional and managerial purposes. Also result indicates that the higher the educational level of lecturers', the more the usage of ICT for instructional and managerial purposes. The obvious implication of this is that, lecturers should be encouraged to involve in professional development in order to improve on their qualifications to enhance usage of ICT for instructional and managerial purposes in the colleges of education. The difference in mean among the age group is in favor of age 30-39 years. Hence, other age groups below and above would need to be re-sensitized on the usage of ICT for instructional and managerial purposes.

The findings of this study revealed that ICT access is important for successful usage of ICT for instructional and managerial purposes. Opportunities of access to ICT has effect on science, technology and mathematics lecturers' usage of ICT for instructional and managerial purposes and it is in favour of those lecturers who have access to ICT both at home and at school. Hence, government and administrators of colleges of education should

ensure that science, technology and mathematics lecturers have access to ICT for successful usage of ICT for instructional and managerial purposes.

The finding of this study revealed that ways of learning to use ICT has effect on ICT usage for Instructional, managerial and personal purposes and this is in favour of those who learn to use ICT at the university. Although, many of the colleges of education in Nigeria have organized in-service training for lecturers on ICT usage, the findings of this study has revealed that those who learn to use ICT through the in-service training are not using the ICT for instructional, managerial and personal purposes more than those who learn at the university. Hence, leaning to use ICT in the university enables the lecturers to appreciate the usage of ICT for Instructional, managerial and personal purposes. This implies that the contents of in-service training for colleges of education lecturers have to be re-designed to focus more on usage of ICT for instructional, managerial and personal purposes.

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