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ASSESSMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY LITERACY SKILLS AND COMPETENCE LEVEL AMONG IN-SERVICE TEACHERS IN NIGERIA

H. O. BOLAJI and F. O. DARAMOLA

Abstract

The development and innovation of ICT in teaching-learning process is an investment for the advancement of education. The way pre-service teachers are taught affects greatly the way they teach. Despite ICT integration into their training, poor implementation in the classroom is pervading and this might be due to the levels of literacy skills and competence in the use of ICT. This study assessed the ICT literacy skill and competence levels of in-service trainee teachers in Nigeria. This study is a descriptive survey research and a convenience sampling technique was used to select two hundred and eighty three in-services teachers from Institute of Education, University of Ilorin. The in-service teachers are from different parts of the country on continuous education programme at the Institute of Education. A researcher-designed questionnaire of sections A-C was used to sample the opinion of respondents. The questionnaire was validated by three educational technology lecturers and the Cronbach's Alpha coefficient reliability is 0.83. Six research questions were raised and responses were analysed using frequency count and percentages. The result showed that the in-service trainee teachers possess high literacy skill but their competence level is at a lower proficiency. Therefore, it is recommended that in-service trainee teachers need to improve on their competence level by attending relevant workshops in order to meet up with UNESCO competence framework in information and communication technologies (ICT).

Introduction

Information and Communication Technology (ICT) is computer based tools used by people to work with information and communication processing needs of an organization (Yusuf & Balogun, 2011). United Nations Education and Socio-Cultural Organization (UNESCO, 2004) defined Information and Communication Technologies (ICTs) as technologies used to communicate and to create, manage and distribute information. This definition of ICTs might include computers, the Internet, telephones, television, radio and audiovisual equipment. ICT refers to the applications found on most thin client computers, internet and other electronic delivery systems such as radio, digital televisions, and projectors among others that teachers can use as pedagogical tools (Ndibalema, 2014). The use of ICT brings about a powerful learning environment and it transforms the learning and teaching process for students to deal with knowledge in an active, self-directed and constructive way (Volman & Eck, 2001). According to Singh and Chan (2014), ICT is seen as an important instrument that promotes and supports existing and new ways of teaching-learning process. Murray (2008) opined that information and communication technologies are changing everything, transforming organizations, and redefining the skills and talents needed to succeed in the 21st century. In the submission of Adodo (2012), tertiary institutions are relevant actors in the social system in the supply of new professionals that possess universalistic skills for better identification of social and economic responsibilities; including its roles among others is education and leaning.

Higher education institutions, especially those in the West, have adopted ICT as a means to transmit upon students the knowledge and skills demanded by 21st century educational advancement (United Nations Educational, Scientific and Cultural Organization, UNESCO, 2009). The development and innovation of ICT in teaching-learning process is directed at teachers because they are the people who use these ICT investments for the development of education (Singh & Chan, 2014). The way pre-service teachers are taught affects greatly the way they teach, and despite ICT integration in their training, it is poorly implemented in the classroom (DeGanarro, 2010; Martinez, 2009). The ICT policy goal of technology literacy approach is to prepare learners, citizens, and a workforce that is capable of taking up new technologies to support social development and improve economic productivity (UNESCO, 2008). ICT proficiency is the ability to use technological tools and networks to define information need, access, manage, integrate and evaluate information. The ability to access, evaluate, organize and use information from a variety of sources is known as Information literacy (Humes, 2003). The concept of minimum information and communication literacy skills requires an ICT user to be able to locate, evaluate, and communicate information as an important outcome of teaching-learning process (Zelman, Shmis, Avdeeva, Vasiliev & Froumin, n. d.). ICT literacy otherwise known as technological literacy can be considered as the ability to know and to use technology adequately, and it also refers to the application of technology effectively as a tool to research, organise, evaluate and communicate information (Oye, A.Iahad, & Ab.Rahim, 2012).

The Educational Testing Service (ETS, 2004) defined ICT literacy as using digital technology, communication tools, and or network to access, manage, integrate, evaluate, and create information. In the opinion of Oye, A.Iahad, & Ab. Rahim (2012) ICT literacy may be grouped into three classes: first class pertains to knowledge of technology, the second class entails skills relevant to using the technology, and the third involves attitudes accruing from critical reflection of technology use. Lowe and McAuley (2000) submitted that ICT literacy embroils the skills and abilities that will enable the use of computers and related information technologies to meet personal, educational and labour market goals.

In the policy statement explanation of the competence framework by UNESCO (2008), teachers who show competence with the knowledge creation approach will be able to design ICT-based learning resources and environments; use ICT to support the development of knowledge creation and critical thinking skills of students; support students' continuous reflective learning; and create knowledge communities for students and colleagues. They will also be able to play a leadership role in training colleagues and in creating and implementing a vision of their school as a community based on innovation and continuous learning, enriched by ICT. ETS (2001) designed a framework for ICT literacy through the international panel's definition of ICT literacy. Accordingly, ICT literacy is the ability to use "digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society."

The use of Information and Communication Technologies (ICT) as learning tools attempt to assist students to gain a level of competence in every day problem-solving (Lowther, Bassoppo Moyo and Morrison, 1998). Irrespective of the quantity and quality of technology accessible to teachers, the right attitude must be developed in order to acquire competence that will propel its utilization for teaching-learning process (Kadel, 2005). Competence is

defined as the ability to combine and apply relevant attributes to particular tasks in particular contexts (Danner & Pessu, 2013). These attributes include high levels of knowledge, values, skills, personal dispositions, sensitivities, capabilities, and the ability to put those combinations into practice in an appropriate way (Commonwealth Department of Education, Science and Training, 2002). ICT competence describes what a teacher should know in order to provide guidance in the usage of technology for professional practice (Danner & Pessu, 2013). Kirschner and Woperies (2003) highlighted some major ICT competencies teachers require to include; making personal use of ICT; mastery of a range of educational paradigms that make use of ICT; making use of ICT as minds tools; using ICT as tool for teaching; mastering a range of assessment paradigms which involves the use of ICT; and understanding the policy dimensions of the use of ICT for teaching and learning. In the explanation of technology literacy in the ICT competence standard document by UNESCO (2008), it was highlighted that ICT literacy guides in making provision for quality resources to all, improving literacy skills which includes the use of range of hardware and software resources or tools for personal and community development.

According to Prendes, Castañeda & Gutiérrez (2012), for a teacher to be considered ICT competent, s/he should be competent in at least five closely related areas: the pedagogical area; knowledge of the social, ethical and legal aspects related to ICT use in teaching; skills for ICT based school management; the use of ICT in teachers' professional development; and the area of technical know-how. Therefore, Successful integration of ICT in the school system depends largely on the competence and attitude of teachers towards the role of modern technologies in teaching and learning (Yusuf & Balogun, 2011). Hence, ICT literacy skill and competence level of in-service trainee teachers can assist in effective integration and utilization of ICT. It is then pertinent to assess the ICT literacy skill and competence level of in-service trainee teachers in Nigeria. Zelman, Shmis, Avdeeva, Vasiliev & Froumin (n. d.) explained that ICT literacy assessment focuses on cognitive problem-solving, critical reasoning and critical reading skills associated with using technologies to handle information. They further identified that assessment measures ICT literacy through seven processes, which represents important problem-solving and critical thinking aspects of ICT literacy skill. The seven components include define, access, manage, integrate, evaluate, create and evaluate.

Yusuf (2005) reported that teachers in Nigerian secondary schools are not competent in basic computer operations and in the use of the generic software. If teachers are expected to integrate ICT into the school curriculum, preparations must be made at the pre-service teacher education level. Most studies conducted on ICT have focused the pre-service teachers examining the determining factors that promote and mitigate the integration and utilization of ICT in teaching-learning process (Suliman, Khaidzir & Khaidzir, 2014; Markauskaite, 2005; Yusuf & Balogun, 2011; Danner & Pessu, 2013), while little or no information known to the researchers is available on ICT literacy skill and competence levels of in-service trainee teachers in Nigeria. Therefore, it is against this background that the researcher sought to assess the ICT literacy skill and competence levels of in-service trainee teachers in Nigeria.

Research Questions

1. To what extent can in-service trainee teachers use ICT tools to access information?
2. To what extent can in-service trainee teachers manage information using ICT tools?
3. To what extent can in-service trainee teachers integrate ICT tools in communicating information?
4. What is the competence level of in-service trainee teachers in evaluating information using ICT tools?
5. What is the competence level of undergraduate in creating information using ICT tools?
6. What is the competence level of in-service trainee teachers in communicating knowledge through ICT tools?

Methodology

This study assessed the ICT literacy skill and competence level of in-service trainee teachers in Nigeria adopting descriptive survey method. A researcher-designed questionnaire of three sections (A-C) was developed by the researcher, and it was subjected to validation before it was administered on the selected samples. The Cronbach's Alpha Coefficient reliability was 0.83. The section A dwelled on demographic information of respondents, while the section B addressed questions on ICT literacy skill on five Likert scales of Strongly Agree (SA), Agree (A), Undecided (U), Strongly Disagree (SD) and Disagree (D). Finally, the section C was based on competence level of the in-service trainee teachers in the use of ICT tools on a three Likert scales of Low Proficiency (LP), Moderate Proficiency (MP) and High Proficiency (HP). Convenience sampling techniques was adopted in the sample selection and the sample was made up of two hundred and eight-three in-service trainee teachers (82 males and 21 females) drawn from Institute of Education of University of Ilorin. Sample responses were collated and subject to frequency count and percentages.

Result

Research Question 1: To what extent can in-service trainee teachers use ICT tools to access information?

Table 1: Frequency Count, Percentages and Mean on Use of ICT Tools to Access Information

SN	ACCESS INFORMATION: I can	SA (%)	A (%)	U (%)	D (%)	SD (%)	Mean
1	access the internet with my ICT tools	235 (83%)	48 (17%)	-	-	-	1.2
2	do some of my assignment online with my ICT tools	123 (43.5%)	53 (18.7%)	70 (24.7%)	8 (2.8%)	29 (10.2%)	2.1
3	use the world wide web (www) to access information	133 (47%)	57 (20.1%)	63 (22.3%)	15 (5.3%)	15 (5.3%)	2.0
4	access different search engine with my ICT tools e.g Google, Yahoo	167 (59%)	80 (28.3%)	29 (10.2%)	2 (7%)	5 (1.8%)	1.6

From Table 1, 100% of in-service trainee teachers agreed that they access the internet with their ICT tools. Also, 62.2% of the respondents agreed that they do some of their assignment online using their personal ICT tools and in addition, 67.1% access the World Wide Web (www) with same ICT tools. Finally, 87.3% agreed that they can access different search engines like Google, yahoo etc. with their ICT tools. In conclusion therefore, majority of the in-service trainee teachers can access information using their ICT tools.

Research Question 2: To what extent can in-service trainee teachers manage information using ICT tools?

Table 2: Frequency Count, Percentages and Mean on Managing Information with the Use of ICT

SN	MANAGE INFORMATION: I can	SA (%)	A (%)	U (%)	D (%)	SD (%)	Mean
5	use ICT tool to find specific information	197 (69.6%)	73 (25.8%)	-	-	13 (4.6%)	1.4
6	use ICT tool to find relevant information	201 (71%)	82 (29%)	-	-	-	1.3
7	take part in an on-line chat	233 (82.3%)	31 (11%)	-	-	19 (5.7%)	1.3
8	download any online documents	159 (56.2%)	73 (25.8%)	-	-	51 (18%)	1.8
9	publish documents/files online for public or group access	93 (32.9%)	67 (23.7%)	14 (4.9%)	89 (31.4%)	20 (7.1%)	2.6

It was revealed in Table 2 that 95.4% of the respondents agreed they can use ICT tools to find specific information online, and 100% of the sample can find relevant information with their ICT tools as well. 93%, 82% and 56.6% of respondents can manage information with their ICT tool by taking part in online chatting, download online document and publish document or files online for group access respectively. It then implied that majority of the in-service trainee teachers can manage information

Research Question 3: To what extent can in-service trainee teachers integrate ICT tools in communicating information?

Table 3: Frequency Count, Percentages and Mean on Integrating ICT tools for Communication

SN	INTEGRATE ICT: I can	SA (%)	A (%)	U (%)	D (%)	SD (%)	Mean
10	send an attachment with ICT tool	117 (41.3%)	73 (25.8%)	6 (2.1%)	59 (20.8%)	28 (9.9%)	2.3
11	use information from the internet in my projects and/or assignments with ICT tools	219 (77.4%)	57 (20.1%)	-	-	7 (2.5%)	1.3
12	also download a file from the internet with my ICT tools eg. music, games	173 (61.1%)	77 (27.2%)	-	6 (2.1%)	27 (9.5%)	1.6
13	copy and paste information from searches into personal documents with ICT tools	89 (31.4%)	137 (48.4%)	4 (1.4%)	39 (13.8%)	14 (4.9%)	2.1
14	save an image or graphic from an internet page	147 (51.9%)	67 (23.7%)	3 (1.1%)	-	51 (18.0%)	2.0
15	use a bookmark to store a useful internet web address with ICT tools	45 (15.9%)	78 (27.6%)	107 (37.8%)	12 (4.2%)	41 (14.5%)	2.6
16	use my ICT tools to create a simple web page for classroom discussion	15 (5.3%)	48 (17%)	210 (74.2%)	7 (2.5%)	3 (1.1%)	2.8
17	use a known web address to find useful information with ICT tools	214 (75.6%)	69 (24.4%)	-	-	-	1.2

In Table 3, 67.1% of the respondents went for positive option connoting that they can send an attachment with their ICT tools, and 97.5% also responded positively to capability of using information from the internet for their project and assignment. Furthermore, 88.3% of in-service trainee teachers agreed to downloading document/files from the internet with ICT tools and, 79.8% can copy, paste information from the search engines into personal documents with ICT tools. In addition, 75.6% and 43.5% of respondents can save image or graphic from the internet page and use bookmark to store a useful internet web address with ICT tools respectively. Majority (74.2%) of in-service trainee teachers are undecided on their capability to create simple web page for classroom discussion and 100% of responded positively to the ability of using a known web address to find useful information with ICT tools.

Research Question 4: What is the competence level of in-service trainee teachers in evaluating information using ICT tools?

Table 4: Frequency Count, Percentages and Mean on Evaluating Information with ICT Tools

SN	EVALUATING INFORMATION	LP (%)	MP (%)	HP (%)	Mean
18	Use ICT to search for relevant information via the search engines	177 (62.5%)	30 (10.6%)	76 (26.9%)	1.6
19	Screen online information to download useful ones	78 (27.6%)	178 (62.9%)	27 (9.5%)	1.8
20	Navigate through the internet to get important links that is relevant to purpose	184 (65%)	25 (8.8%)	74 (26.1%)	1.6
21	Carefully select choice of words to guide the internet search	121 (42.8%)	7 (2.5%)	155 (54.7%)	2.1

As revealed in Table 4, 62.5%, 10.6% and 26.9% of in-service trainee teachers have low proficiency, moderate proficiency and high proficiency respectively in using ICT tool to search relevant information via the search engines. Likewise, majority (62.9%) of respondents do possess low proficiency in screening online information before useful download is made. 65% revealed low proficiency and 54.7% showed high proficiency in online information navigation and careful selection of choice of words respectively when searching the internet.

Research Question 5: What is the competence level of undergraduate in creating information using ICT tools?

Table 5: Frequency Count, Percentages and Mean on Creating Information with ICT Tools

SN	CREATING INFORMATION	LP (%)	MP (%)	HP (%)	Mean
22	Type and save information to create document with ICT tools e.g. MS-Word, Excel, PowerPoint, etc.	82 (29%)	36 (12.7%)	165 (58.3%)	2.3
23	Send saved documents as attachment through the electronic mail with ICT tools	60 (21.2%)	132 (46.6%)	91 (32.2%)	2.1
24	Create chat group system in any of the social media platform with ICT tools	236 (83.4%)	20 (7.1%)	27 (9.5%)	1.3
25	Edit existing audio, video or multimedia files containing useful information	141 (49.8%)	116 (41%)	26 (9.2%)	1.6
26	Upload audio, video, or multimedia files with ICT tools for online access	148 (52.3%)	118 (41.7%)	17 (6%)	1.5

From Table 5, typing and saving information to create document with ICT tools showed that a large percentage (58.3%) of in-service trainee teachers possess high proficiency level and 46.6% representing the majority exhibited moderate proficiency in sending saved documents as an attachment through electronic mail with ICT tools. Also, 83.4% of respondents displayed the competence to create chat group system on any social media platform at low proficiency, while 49.8% and 52.3% exhibited competence in editing and uploading audio, video or multimedia files respectively

Research Question 6: What is the competence level of in-service trainee teachers to communicate knowledge through ICT tools?

Table 6: Frequency Count, Percentages and Mean on Communicating Information with ICT Tools

SN	COMMUNICATING INFORMATION	LP (%)	MP (%)	HP (%)	Mean
27	Send messages through electronic mailing system via ICT tools, e.g. Yahoo mail, Google mail, etc.	52 (18.4%)	63 (22.3%)	168 (59.4%)	2.4
28	Take pictures of my surroundings and upload it to the internet	31 (11%)	217 (76.7%)	35 (12.4%)	2.0
29	Interact with superior experts for clarification and explanation of technical terms in my field of study	213 (75.3%)	40 (14.1%)	30 (10.6%)	1.3
30	Chat online with peers or colleagues with ICT tools on social media e.g. Whats App, Facebook, etc.	23 (8.1%)	23 (8.1%)	237 (83.7%)	2.7
31	Use skype, TeamViewer or other related internet calling application software	211 (74.6%)	54 (19.1%)	18 (6.4%)	1.3

Aside sending messages through electronic mail and chatting online with peers that displayed high proficiency of 59.4% and 83.7% respectively, other items revealed low proficiency. For example, 74.6% displayed low proficiency for using Skype, TeamViewer or other related internet calling application software. In the same vein, moderate proficiency is exhibited for interacting online at 75.3% which represented majority of the respondents.

Conclusion and Recommendations

The Information and Communication Technology (ICT) literacy of in-service trainee teachers was assessed from the perspective of accessing information, managing information and integrating ICT tools for sharing information, while evaluating, creating and communicating information with ICT tools was set as parameters for assessing the competence level. From the results, it was revealed that the ICT literacy skill of in-service trainee teachers is favourable but the competence level needs to be improved upon. Based on the result of the findings, the following recommendations were made:

1. In-service trainee teachers should be encouraged more to access information online through their ICT tools in order to improve their literacy skill.
2. In-service trainee teachers should be encouraged to publish documents/files for online access by their peers.
3. There is need to improve on literacy skill aspect of creating a simple classroom web page and ability to store bookmark web address for easier integration of ICT tool.
4. Improvement is needed in stepping up the competence level of in-service trainee teachers to high proficiency at the stage of evaluating information with ICT tools by organizing workshops.
5. There is need to also advance ICT competence on creating information through increase in proficiency to higher level for in-service trainee teachers through. This could be done by attending seminars on ICT integration in teaching and learning.
6. The communication of information through ICT tools also calls for improvement in the area of competence to high proficiency level via organization of periodic workshops, training and re-training.

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