

PEDAGOGY AND SKILL ACQUISITION FOR INSTRUCTIONAL DELIVERY: A CASE STUDY OF SCIENCE TEACHERS IN TERTIARY INSTITUTIONS IN KOGI STATE, NIGERIA

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Abstract

The quality of a nation's Science and technology development depends largely on the quality of its Science and Technology manpower. To attain global standards in science and technology education, Information and Communication Technology (ICT) must be integrated into the nations Science and Technology Education. This can be done effectively if those who are to train the Science Technology Teachers are themselves role models in the effective use of ICT in science teaching. The study assessed the Science Teacher Trainers in Kogi State, their literacy level in the use of ICT in teaching and learning. A proportionate sample of 108 Science Teacher Trainers drawn from the four tertiary institutions in the State were assessed using an ICT Literacy Assessment Scale (ILAS). Two research questions guided the study. The data gathered from the assessment scale were described using mean scores and standard deviation. The findings of the study were that: Science Teacher trainers were moderately able to perform ICT tasks that support instruction but low in their ability to perform tasks required to Integrate ICT into Instruction. The study concluded that the Science Teacher Trainers in the state were not sufficiently literate in ICT usage in teaching and learning to model same to their students. Based on the findings, recommendations were made among which is the establishment of Educational/Instructional Technology Centers in the University and Colleges of Education in the state for pre-service in-service training on ICT usage.

Keywords: ICT, Teaching, Teachers and Technology

Introduction

Information and Communication Technology (ICT) have become an integral component of the global lifestyle. Almost all formal and informal activities world- wide are powered by ICT. It has become one of the major contemporary factors producing rapid changes in society and shaping the global economy, (Abdullateef, 2018). We are indeed in an ICT era. The social of economic development of the less developed nations may inevitably be consequent on their ability to adopt and integrate ICT in the various facet of their economy.

Education being the tool for development of the necessary human resources that will bring about the nations technological and economic development, should not be left out in ICT integration, ICT in its versatility and all-encompassing nature can provide opportunities for the exploration of high level cognitive and psychomotor activities such as critical thinking, creativity, problem solving and acquisition skills among students. The teacher can provide wide and varied learning experiences that extenuate his pedagogical skills, ICT based technologies are able to improve the quality of teaching and learning and provide opportunities for life-long learning and professional development through e-learning internet, virtual classroom, and data base.

However, while many nations of the world have effectively integrated ICT into the mainstream of their educational practices, Nigeria is still providing "non-ICT based education, the existence of various barriers to effective ICT integration in education among the less-developed nations such as poor infrastructure, provision of equipment and lack of personnel training, has created a digital-divide among them (Dirsuweit, 2009). Okebukola (2016), among the gaps worthy of note still existing in teacher education in Nigeria is the need to enhance ICT education. If Nigeria is to be at par with other nations in providing quality education, ICT should form an integral part of our educational practices.

Thus, "ICT-based-education" is an imperative for quality education and to achieve this, the existing barriers causing the divide must be decisively and vigorously addressed, in tackling the digital divided. The focus should include the areas of skills, usage, and access to these new technologies, especially among, teachers who are to impart the knowledge. The effective integration of ICT into education requires that "teachers be in the fore front of ICT access and usage so that it can impact on their

pedagogical skills and ‘thus the quality of education delivery. However, the teacher trainers have the greatest responsibility of setting the pace of competence in ICT usage in education. Until teacher educators model effectively, the use of ICT technology in their own classes, it will not be possible to prepare a new generation of teacher’s who will effectively use the new tools for teaching and training. (Adullateef, 2018). As we pursue the integration of ICT in the implementation of the National policy on Education how Proficient are our teacher trainers in these skills.

Research Questions

To guide this study the following research questions were generated:

- (1) To what extents are Science Teacher Trainers are able to perform basic ICT tasks that support instructional delivery?
- (2) To what extents are Science Teacher Educators able to perform ICT tasks relevant to integrating ICT into instructional delivery?

Literature Review

Technologies in education facilitate skills and knowledge acquisition; enhance learning opportunities and invigorates learning by making it interesting, exciting and concrete. The existence of these technologies set a pace for achieving global standards in education. This poses increased demand on teachers who are now to meet the challenges of integrating the new technologies into teaching and learning. This also in turn compels teacher training institutions to undergo rapid changes in the structure and content of their courses to accommodate the new global standards. Teacher training programmes should not constitute only introductory computer courses which do not permit students to sufficiently acquire any skill in ICT (Asogwa, 2015). Practical integration of ICT into teacher training should encompass courses on the use of computer application softwares for teaching topics in the various subject areas; practical use of multi-media in enhancing lesson delivery; internet surfing and information locating and retrieval. Emphasis on the integration of ICT in teacher education should not out be on skill acquisition but also on the pedagogy behind the effective use of the technologies.

Skill in pedagogical uses of ICT in the various subject areas should be possessed first by teacher trainers to effectively be role models in demonstrating how ICT can be used effectively in teaching/learning. Educators who are “skilled in the use of technology for learning and are consistently exposed to professional development in the use of the changing technologies for teaching and learning is an essential condition for implementing ICT in the teacher education’ (UNESCO, 2012). The clamor for ICT in education is yet to yield the desired results. However, many educational institutions have through government assistance and private sector donations or independently strived to provide ICT facilities for the use of staff and students. ICT integration must not only revolve wound physical provision of the required technologies and infrastructure, but there should also be enlightenment, training, and capacity building of the teacher educators on the effective use of the new technologies. This forms the basis of a sound foundation for ICT implementation in Teacher Education.

The Nigerian science Teacher Education has a unique task of empowering science teachers with the necessary ICT pedagogical and enhancement skills that would enable them to provide meaningful science teaching and learning that can increase students’ interest in the Sciences. This makes the task of science teacher educators even more challenging than other subject disciplines and creates a need for ICT based instructional practices in science subjects. This is not only to meet global standards in dedication but also to break the monotony of traditional pedagogical practices and generate more interest in this subject. ICT can make a great impact in the science class. Science subjects are often presented to pupils in a stereo type, mundane manner which make students perceive them as difficult subjects. The infusion of ICT into science teaching can powerfully be used to assist students to explore, develop, express, and critically redraft ideas and concepts. A teacher’s possession of ICT skills is vital but an understanding of how ICT support is anti-enhance the learning task may be even more important (La Velle, McFarlane & Brown, 2014). These issues must be put into proper prospective for in this “high tech” era the quality of a nation’s science and technological education reflects on the quality of its science and technological manpower.

Tella, Toyobo, Adika. and Adeyinka (2007) said ICT can be applied in teaching and learning in several ways; to support instruction in this way it is used to complement delivery. Supportive ICT uses include

word processing, internet surfing for information and using e-mail to give assignments. It is also used as a tool to promote learning when it is integrated into the design and planning of instruction. An ICT literate Science Teacher Educator should be able to demonstrate basic, understanding and skills in the various uses of ICT in instruction.

Most science teacher educators in many countries of the globe are in advanced stage of ICT professional development. Whereas the Nigerian science teacher educators are still struggling with basic computer literacy and most likely are unaware of the possible applications of ICT in science instruction, ICT literacy is here being referred as the ability to perform basic ICT tasks that can complement and integrate ICT delivery in Science Teacher Education. As Educationists agitate for the integration of ICTs in Teacher Education, this study looks at thy capacity of Science Teacher Education in Kogi State in the use of ICT, do they possess basic ICT literacy skills? This should form a platform for the integration of ICT in Teacher Education in the State.

Methodology

A descriptive survey design was adopted in carrying out the study. The target population of the study was all the Science Teacher Trainers in Kogi State. This comprised of a total of approximately 300 lecturers present in four tertiary institutions in the state. A sample of 120 Science 'teacher Trainers was drawn from these institutions using proportionate sampling. These include 20 Science Teacher Trainers from the Science Department Kogi state University Anyigba; 40 from the State College of Education Ankpa; 20 from the State Polytechnic Lokoja and 40 from the College of Agriculture Kabba. Out of 120 questionnaires distributed 108 were completed and returned.

An ICT Literacy Assessment Scale (ILAS) questionnaire was used to collect data from the respondents. The questionnaire consisted of a total of 30 items divided into two sections. Section I was on demographic information. Section II consisted of 30 questions which solicited information on knowledge and skills of the science teacher trainers on ICT and its uses in science teaching. Items 1 to 15 solicited information from the teacher trainers on their ability to perform basic ICT tasks that can support and enhance their instructional delivery while items 16 to 30 solicited information on their ability to perform the tasks that are relevant in integrating ICT into the pedagogy. The items on the questionnaire were designed to answer the two research questions generated for the study. The instrument was validated by 5 experts on ICT application. These were lecturers from the department of computer science, science teacher trainers and an educational technologist. The reliability of the instrument was estimated as 0.88 using Cronbachs Alpha internal consistency reliability measure,

A total of 108 questionnaires out of 120 distributed were retrieved from the respondents. The data were analyzed using means and standard deviation, 'the decision rule was established as a mean of 2.5 and above indicated high ICT literacy while from 2.0 to 2.5 indicated moderate ICT literacy and below 2.0 indicated a low ICT literacy level.

Results and Discussion

The results in tables 1 and 2 show the mean and standard deviation scores of the Science Teacher Trainers' ratings of their abilities on basic ICT tasks that support instruction and integrate ICT into instruction.

Table 1: Mean Score and Standard Deviation of Science Teacher Trainers literacy in ICT skills that support instruction

S/N	Item	Mean	SD	Decision
1	Identifying the parts of a computer keyboard	3.28	0.65	HIGH
2	Identifying the operations on windows desktop components	2.72	1.05	H
3	Creating a document on a word processor like MS word, Notepad, word pad etc.	2.78	1.15	H
4	Printing of word processor document	2.33	1.34	MODER(M)
5	Saving of word document on CD or flash disk and other strong media.	2.56	1.10	H
6	Creating spread sheets	2.06	1.13	M
7	Writing formula in spreadsheet	1.94	1.13	L
8	Surfing the world wide web	2.17	1.12	M
9	Accessing relevant search engines on the internet	2.17	1.12	M
10	Using search engines to find specific information on the world wide web	2.11	0.99	M
11	Creating an email account	1.8	1.02	L
12	Sending and checking e-mails	2.4	1.22	M
13	Attaching application files to e-mails	2.11	1.17	M
14	Uploading/downloading files to and from the internet	2.22	1.28	L
15	Scanning documents	2.11	1.16	M
	Group Mean	2.32	1.12	

Source: Field Survey (2021)

Table 1 illustrates mean and standard deviation scores of the Science Teacher Trainers' ratings of their abilities on basic ICT tasks that support instruction and integrate ICT into instruction. The result established that most of the respondents can identify the parts of a computer keyboard with a mean of 3.28. Apparently, it is evident that science teachers' trainers possess the adequate abilities on how to use ICT to support their teaching and learning.

Table 2: Mean Score and Standard Deviation of Science Teacher Trainers Literacy in skills of integrating ICT into instruction

S/N	Item	Mean	SD	Decision
1	using graphics software to create images/pictures	2.28	1.18	M
2	using graphics software to create images/pictures	1.94	1.18	L
3	Identifying quality instructional software's	2.17	1.18	L
4	Using instructional software's like Discrete Educational Software	1.8	1.02	L
5	Using interactive video in the classroom	1.66	1.01	L
6	Using presentation software to create a lesson or lecture	2.0	1.11	L
7	I can use the interactive white board (IWB)	1.94	1.18	L
8	Using the IWB to plan my lesson/	1.66	0.95	L
9	Using multimedia equipment to design lessons.	1.61	0.94	L
10	Ability to use simulations and virtual reality in my lessons	1.56	0.76	L
11	Using modeling software's to simulate laboratory exercises	1.94	0.89	L
12	Using virtual laboratories to perform practical	1.94	0.77	L
13	Using computer software's to compute and stored data generated during practical sessions	1.94	1.83	L
14	Running/ viewing a video CD on a Video CD player	1.94	1.20	M
15	Using camcorder to tape an event	1.78	0.98	L
Grand mean		1.84	1.07	

Table 2 illustrates mean and standard deviation scores of the Science Teacher Trainers' ratings of their abilities on basic ICT tasks that support instruction and integrate ICT into instruction. The result established that most of the respondents can use graphics software to create images/pictures with a mean score of 2.28. Apparently, it is evident that science teachers' trainers possess the adequate abilities on how to use ICT to support their teaching and learning.

Discussion

The study revealed that science teachers' trainers possess adequate abilities on how to use ICT to support their teaching and learning. These results substantiate the fact that there is a skill gap in ICT education (Okebukola, 2016); and that the digital divide (Dirsoweit, 2010) is a reality. Science teachers exhibited moderate literacy in ICT tasks that are necessary for supporting instructional practices. The study further revealed that science teachers possess literacy skills in integrating ICT into instruction. In as much as the Science teacher trainers possess moderately ICT skills that support and enhance instruction, these skills have not been integrated into instructional delivery, which is an essential aspect in science teaching. Science teacher trainers in the state having exhibited these levels of literacy in basic ICT instructional skills do not have the capability to model these ICT skills to their students as suggested by Abdulateef (2018). This could be an impediment of the integration of ICT at all levels of Science Education in the state.

Conclusion

Science Teacher Trainers ICT literacy levels are not sufficient to model the effective use of ICT in teaching their students to achieve the effective integration of ICT in Science teacher education and eventually Science teaching in schools in Kogi state. The professional development of Science Teacher Trainers in ICT skills for teaching and learning must be among the leading priorities.

Recommendations

Based on the findings and conclusion of this study, the following recommendations were made Science teacher Educators can be professionally trained in ICT usage in science teaching through the establishment of Instructional Technology centers in the university and college of education in the state. These centers will direct departments on the use of ICT tools effectively and will provide continuous in-service training for teachers. The centers can also provide consultancy services on ICT procurement. Periodic ICT proficiency examinations for science Teacher Education can also motivate them to learn more about ICT usage.

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