The Social and Management Scientist
Volume 13, Number 4, 2021
ISSN: 2489-0006

INTEGRATING INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHER EDUCATION PROGRAMMES: PRE-SERVICE TEACHERS' PERSPECTIVES

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ABSTRACT

Integrating Information and Communication Technologies (ICTs) into teacher education is the key to equipping and producing professional teachers as well as improving the pedagogy. This study therefore investigated the perception of integrating ICTs in pre-service teachers' education programme (TEP) in Federal College of Education, Osiele and Tai Solarin College of Education, Omu, Ogun State, Nigeria. The study adopted the descriptive survey research design to investigate the background of the research problem and get the required information to carry out further research on the study. Data were collected using Pre-Service Teachers' Perceptions of Information and Communication Technology Integration Scale. A total of 370 participants were selected through stratified random sampling technique from a population of 9,355 pre-service teachers in the selected colleges of education. Results revealed that future teachers have misconceptions around the usefulness of some ICTs in TEP and that there is not enough modeling of ICT pedagogy, both in schools and in the TEP. Also, there is a significant difference in the perceptions of teacher-trainees regarding the integration of ICT in TEP based on type of the programme, (t-cal = -2.345; df =368; p< .05). Pre-service teachers have to realize that ICTs have come to stay in their programme. They need to develop more confidence in their individual ability in becoming computer literate and technology-savvy teachers in order to remain relevant in the modern day information age.

Keywords: Teacher education, information and communication technologies, pre-service teachers, perceptions

INTRODUCTION

The primary objective of 'teaching' is to promote the acquisition of necessary knowledge, skills, and attitudes individually (for a particular student) and collectively (for a society or a country). To achieve this objective, teachers play an important role in the teaching-learning process, where they continuously use and create different teaching models, strategies, and tools (Van Der Sijde 2019). Therefore, integrating Information Communication Technology (ICT) into teacher education is the key to equipping and producing professional teachers as well as improved pedagogy. However, there is the need to consider the type and nature of pre-service before integrating ICT in teacher education programmes, because their perceptions are likely to differ. In recent time, ICT has successfully penetrated virtually all human endeavours, including the field of education. Gulhane (nd) argued that in the modern age, information and communication technology has influenced and become an integral part of all aspects of people's lives. Teacher education is not an exception. Infact, Hennessy, Ruthven, and Brindley (2005) carried out on the integration of ICT into classroom teaching with a view to complementing and modifying the pedagogical practice. Presently, ICT plays an important role in promoting new instructional methods for teaching and learning.

Adding to the views, Hennessy et al. (2005), Nyenwe and Ishikaku (2012) asserted that ICT integration in teacher education is a key to providing professional development for teachers who are the facilitators of education process. By implication, it means that the adoption and integration of ICT in all human endeavours has become so important, integral and indispensable such that an illiterate person in modern day work organisation is that person who is unable to use ICT-related facilities to carry out his day-to-day duties and responsibilities. There is a growing importance for ICT within the school curriculum and the school system at large. Not only it is used to support teaching and learning within other curriculum subjects, but it is also a subject in its own right as a separate discipline. In view of this, it is suspected that to effect genuine change in the classroom and produce competent and effective teachers, teacher education must alter its tools, methods, models and strategies by adopting modern day ICT that appears to be efficacious.

Since teacher education is mainly designed towards preparing teachers, the quality of teacher education depends on the teacher trainee's abilities and skills. Teacher educators have to come to term with the demands of modern world even with the COVID-19 pandemic that further informed the need to embrace digital teaching and modify old concepts and methods according to the needs of learners.

Otherwise teachers will become obsolete in the coming to fore with its devastating consequence on deteriorating the quality and standard of teacher education. Pre-service teachers therefore, need to develop a vision from the very beginning of their careers for using computers and other technological gadgets in their classrooms. For this, student teachers must understand computer operations and programming--leading them to develop a vision of the value and use of computers in learning. It has been asserted by the Federal Government of Nigeria in the National Policy on Education (2013) that no nation can rise above the quality of her education, and also that no educational system can rise above the quality of her teachers. Thus, teachers have been regarded in literature as important components that need to be given attention in the integration of ICT in teaching and learning. There has therefore been an increase awareness of the seminal roles which teachers play in the implementation of ICTs in teaching and learning. Thus, various educational institutions and governments in Africa are emphasizing on teacher development as the key to implementing ICT in teaching and learning hence improving the standards of education (Hennessey, Harrison, & Wamakote, 2010). Student teachers are expected to adopt and use ICTs appropriately in their teaching hence implement the changes expected in pedagogy. It therefore presupposes that integrating ICT in teacher education programme needs to be seriously addressed. This might be the rationale behind the launching of ICT Competency Standards for Teachers (ICT-SCT) by the United Nations Education Scientific and Cultural Organization (UNESCO) in January 2008.

Teaching is increasingly becoming a more challenging profession where knowledge is rapidly increasing and technology is also changing enormously. Hennessey et al. (2010) confirmed that when ICT is used appropriately by teachers, there will be a positive impact on the way the teachers teach and the way the learners learn, thus, improving pedagogy. This therefore demands that teacher-trainees have to learn how to use ICTs in their programme, thus their perceptions about the integration of ICTs need to be investigated as this will help in determining how, when and where ICTs should be integrated. Based on the afore-discussed, it becomes highly imperative that attempt be made at investigating the perceptions of teacher-trainees (both regular and sandwich), about the integration of ICT in teacher education programme. This is because teacher-factor has been regarded as an important issue for consideration when integrating and implementing ICTs into teaching and learning process. Khirwadkar (nd) also argued that pre-service teachers need to develop a vision from the very

beginning of their careers for using computers in their classrooms. For this, student teachers must understand computer operations.

It is noted by Omolewa (2016) that "there have been a struggle in teacher education programme institutions to integrate information and communication technologies in the course of the programme, and at least to ensure that pre-service teachers are well grounded in the required of passing knowledge in the 21st century to pupils and students. Pre-service teachers have diverse perception on the integration of ICT in teacher education programme in terms of how it can be structured in, its contents, challenges and outcomes. This worrisome scenario inspired the researcher into undertaking this study to find out the perception of pre-service teachers on the integration of information and communication technologies into teacher education programmes.

Challenges of ICT Integration in Teacher Education

Every innovation comes with some challenges that must be handled before any success is achieved. Some of the challenges in the integration of ICT in teacher education in reference to Nyenwe and Ishikaku (2012) are:

i. Lack of Good Accommodation: A major challenge in effective ICT integration is suitable accommodation in teacher training institutions where the equipment will be kept and use. Where there is none, one has to be built and properly electrified. In case of existing structures, its electrification fitting has to be ascertained, because safety is important.
ii. Population: The number of students in the institutions, serving teacher and head-teachers are much. Providing all with computers will be quite challenging because of its cost involvement.
iii. Regular Irregular Power Supply: There is no doubt that regular and adequate power supply to run the equipment is important. Power situation in Nigeria poses a serious challenge. So alternative (solar or generator) source must be provided.
iv. Lack of ICT skilled manpower (technicians): Lack of ICT skilled manpower (technicians) who will help trains the teachers. This calibre of personnel is needed in the maintenance of the equipment. These services are important in success of the integration.
v. Lack of ICT Pedagogy Professional: Nigeria lack manpower in terms of professionals that can effectively train teachers on the use of ICT for teaching and learning, as well as develop softwares which are compatible with the various curriculums.

There is the vital need to consider the type and nature of pre-service teachers before integrating ICT in teacher education programme because their perceptions are likely to be different since full-time and part-time pre-service teachers are not likely to be facing similar challenges in the programme. Besides, teachers' educational beliefs can be barriers to ICT integration (as cited in Hermans, Tondeur, van Braak, & Valcke, 2018). All these serve as the motivating factors that necessitated this present study. Thus, the problem of this study is to investigate the perceptions of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme at the Federal College of Education, Osiele and Tai Solarin College of Education, Omu, Ogun State.

Purpose of the Study

The purpose of the study was to determine the perceptions of pre-service teachers regarding the integration of ICT in teacher education programme at the Federal College of Education, Osiele and Tai Solarin College of Education, Omu, Ogun State.

Specifically, the specific objectives are:

1. to determine the perceptions of pre-service teachers regarding the integration of ICT in teacher education programme in terms of structure, contents, challenges and outcomes.
2. to ascertain the difference in the perceptions of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme.
3. to ascertain gender difference in the perceptions of pre-service teachers about the integration of ICT in teacher education programme.

Research Question

1. What is the perception of pre-service teachers regarding the integration of ICT in teacher education programme in terms of structure, contents, challenges and outcomes?

LITERATURE REVIEW

A brief literature review was carried out in this sub-section. This becomes necessary so as to have a better understanding of relevant concepts and variable in the study. It was also carried out in order to be familiar with some of the previous studies earlier done in this area by previous researchers.

The Concept of Teacher Education

Teacher education has been variously defined by scholars in the field of education. For instance, Okafor (Onyemerekeya, 2012) described teacher education as a form of education which is properly planned and systematically tailored and applied for the cultivation of those who teach or will teach, particularly, but not exclusively in primary and post-primary levels of education. Teacher education refers to that educational programme basically designed with a view to equipping pre-service teachers with the attitudes, skills and knowledge, required of them to perform their tasks effectively in the classroom, school and wider community.

According to Perraton (2010), teacher education generally includes four elements, and the balance between them varies widely. These elements have to do with improving the general educational background of the teacher-trainees; increasing their knowledge and understanding of the subjects they are to teach; pedagogy and understanding of children and learning; and the development of practical skills and competences. In Nigeria teacher education is provided in Colleges of Education, Faculties and Institutes of Education and Universities, National Teachers' Institute and some Schools of Education of Polytechnics.

Conceptualizing Information and Communication Technology

Information and Communication Technology (ICT) is "an equipment or interconnected system of equipment that is used in the automatic acquisition, storage, manipulating, management, control, display, switching and transmission of information (National Policy for Information Technology (FRN, 2004). ICT is described as a generic term referring to technologies which are being used for collecting, storing, editing and passing of information in various forms Ser (as cited in Jager & Lokman, 2019). In the submission of Ololube, Ubgu, and Ossai (2016), ICT refers to advances in technology that provides a rich global resources and collaborative environment for dissemination of ICT literacy materials, interactive discussions, research information and international exchange of ideas, which are critical for advancing meaningful education initiative, training high skilled labour force and understanding issues related to economic development.

Development of ICT in Nigeria

Information and Communication Technology, particularly computer education was introduced in Nigeria around mid-1960s, with the assistance of 1BM that set up computer centres at the Universities of Ibadan, Ibadan; Lagos, Akoka; Ife (Obafemi Awolowo University), Ile- Ife; Nigeria, Nsukka; Ahmadu Bello University, Zaria. These computer centres later metamorphosed into Manpower Development Centres according to Nyenwe and Ishikaku (2012). However, the idea of introducing computer education into secondary education was conceived during the 32nd meeting of the National Council on Education (NCE) in 1987.

Several other measures and initiatives have been put in place towards the development of ICT in Nigeria. These include the implementation of ICT Policy on April 18th 2001, which paved the way for the establishment of National Information Technology Development Agency (NITDA), the production of Nigerian Policy for Information Technology (IT) by the Nigeria Information and Communication Technology Agency (NICTA). Furthermore, the National Technology Development Fund (NITDEF) was established; and on August 7th 2004, the National Information and Communication Technologies Strategic Action Plan Committee was inaugurated by the Federal Government of Nigeria.

All these measures, philosophies and objectives have equally been captured and incorporated in the current National Policy on Education (2013). These measures, as opined by Jegede and Owolabi (2003) and Uwadi (2003), were adopted by the Federal government as a way of harnessing the benefits of ICT in national development and as well building her human capacity.

Students' Perceptions of ICT Integration in Teacher Education

Generally, teachers are expected to know how to successfully integrate ICT into his/her subject areas to make learning more meaningful. This knowledge development during pre-service training has gained much importance with the notion that exposure to ICT during this time is helpful in increasing student teachers' willingness to integrate technology into classroom teaching. Pre-service teachers need to plan to use computers in their classrooms.

According to Khirwadkar (nd), it has generally been found that pre-service teachers have demonstrated their ability for integrating technology into their teaching, but do not have clarity about how far technology can be beneficial for students. There have been several studies which probed into the attitude of teacher-trainees towards the integration and use of technology, with findings that revealed the importance of attitudes for learning to use technologies (Cox, Rhodes, & Hall, 1988; Davidson & Ritchie, 1994; Hannaford, 1988; Kay, 1990).

Skills and Competencies Required of Pre-Service Teachers

For teacher-trainees to be able to integrate ICT successfully, they have to acquire and develop certain skills and competencies. These skills and competencies to be developed on the part of student teachers according to Khirwadkar (nd) include:

- Surfing the Internet and locating useful information from the Internet for the development of lesson plans.
- Developing lessons plans incorporating student use of technology in the learning process.
- Evaluating and selecting appropriate software for a particular subject and per student needs.

- Generating printed documents like student assignments, newsletters, communication, etc. utilizing a variety of applications software like word processing and desktop publishing.
- Managing student data; using data management tools for efficiently managing learning.
- Using technologies to gather, organize, and report information about student performance like Excel and Access for database management.
- Developing tools to evaluate technology-based student projects including multi-media, word processing, database, spread-sheet, PowerPoint, desktop publishing, and Internet/telecommunications.

Hypotheses

Two null hypotheses were formulated with a view to addressing the two study objectives:

1. There is no significant difference between the perception of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme.
2. The perceptions of pre-service teachers about the integration of ICT in teacher education programme do not significantly differ based on gender.

METHODOLOGY

Research Design

The study adopted the descriptive research design to ascertain the differences in the perceptions of full-time and part-time pre-service teachers undergoing NCE programme in Federal College of Education, Osiele and Tai Solarin College of Education, Omu, during 2020/2021 academic session.

Study Population

The population consisted of 9,355 full-time and part-tine pre-service teachers at the Federal College of Education, Osiele (5,237) and Tai Solarin College of Education, Omu (4118) as at the time of conducting this study.

Sample and Sampling Technique

Three hundred and seventy participants were selected for the study through disproportionate stratified random sampling technique. The participants were first separated into full-time and part-time. Two hundred and full-time students and one hundred and seventy part-time students were then sampled, regardless of the population of each stratum.

Instrument

A self-constructed instrument titled: Pre-Service Teachers' Perceptions of Information and Communication Technology Integration Scale (PSTPICTIS) was used for the study. It comprised two parts. Part one sought information on socio-demography background of the subjects such as age, gender, marital status, and type of programme. The second part probed into the perceptions of the participants which they rated on a modified four-point Likert scale of Strongly Agreed (SA), Agreed (A), Disagreed (D), and Strongly Disagreed (SD) with score weights of 4, 3, 2, and 1 respectively. Positive statements were scored in ascending order while negatives ones were scored in descending order for effective data analysis.

Validity and Reliability of the Instrument

The validity of the instrument, in terms of face and contents, was ascertained by experts in the Department of Educational Technology. Also, a pilot study was carried out in order to determine the reliability of the Instrument. Cronbach Alpha was used for reliability

test, and an Alpha value of .88 was obtained. This is good enough for the instrument to be relied on.

Procedure

The administration of the instrument was jointly done by the researchers with the supports of six Head of Classes (HOCs) who serve as Research Assistants. Four hundred copies of the instrument were distributed, with three hundred and ninety-one retrieved. Three hundred and seventy copies that were completely filled were eventually used for the study.

Data analysis

Descriptive statistics of frequency and percentages was used to describe the demographic background of the subjects. On the other hand, inferential statistics was used to answer the research questions. Research question 1 was answered with the aid of Mean Score and Standard Deviation, while Student Independent t-test was used to test hypotheses; the perceptions of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme and the perceptions of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme do not significantly differ based on gender.

RESULTS

Results obtained from the analysed data are as presented below. This was followed by its discussions.

Research Question

1. What is the perception of pre-service teachers regarding the integration of ICT in teacher education programme in terms of structure, contents, challenges and outcomes?

Table 1: Perceptions of Teacher-Trainees Regarding the Integration of ICT in Teacher Education Programme

SN	Categories/Items	Mean	SD
	Structure		
1	I see the Integration of ICT in teacher education as an opportunity to create a positive learning environment to learn.	3.6400	.53879
2	I believe that the integration of ICTs in teacher education will help me carry out my assignment and other research work.	3.7000	.65048
3	I think it is difficult to integrate ICT in teacher education.	2.4800	.98214
	Contents		
4	I think ICT integration into the entire curriculum of teacher education will broaden my breadth and scope.	3.4300	.73206
5	I think it is difficult to develop content via ICT in teacher education.	2.5500	.88048
6	ICT integration in teacher education will enable me acquire the skills and knowledge I need to use technology effectively in my course of study	3.5800	.71846
7	Our curriculum has not been designed in a way to allow ICT integration in the teaching-learning process	3.0000	.89137
	Challenges		
8	Inadequate facilities has affected the integration of ICT in teacher education	3.4300	.77679
9	The problem of power supply will hamper effective integration of ICT in teacher education	3.2800	.95748
9	Technical incompetence on the part of lecturers will be a challenge to ICT integration in teacher education	3.1600	.82536
10	Resistance to change from the traditional pedagogical methods to more innovative technology based method of teaching and learning will hinder ICT integration in teacher education	3.1400	.80302
11	Population of pre-service teachers is a challenge to ICT integration in teacher education	2.9700	.93524
	Outcomes		
12	Integrating ICT in teaching methods will improve academic performance of students	3.5600	.56516
13	Integration of ICT in teacher education will enable me perform better during my teaching practice programme	3.5100	.69869
14	I believe integration of ICT in teacher education will prepare me to be a technology-compliant teacher after my teaching programme.	3.8100	.63326
	GRAND MEAN	**3.43**	**13.22**

Table 1 showed the results of the perceptions of pre-service teachers as regards the integration of ICT in teacher education programme in terms of structure, contents, challenges and outcomes. With respect to Structure, majority of the teacher-trainees that participated in the study agreed to the structure of ICT integration as indicated by the first item (M = 3.64; SD = .539) and the second item (M = 3.70; SD = .650), but disagreed to the third item (M = 2.48; SD = .982).

The perceptions of the pre-service teachers about the contents of ICT integration as shown in the Table indicated that majority of them agreed to the three items (M = 3.43; SD = .732), (M = 2.55; SD = .880), and (M = 3.58; SD = .718) respectively. In terms of challenges, the Table showed that the greatest challenge facing the teacher-trainees in ICT integration into Teacher education was item number one (M = 3.43; SD = .768), followed chronologically by

items two, three, four and five respectively. It was also shown in the Table that as regards pre-service teachers' expectations in terms of outcomes, majority of the participants believed that integrating ICT in teaching methods will enhance their academic performance (M = 5.56; SD = .565), closely followed by the third item (M = 3.51; SD = .699) and the second item (M = 3.81; SD = .633) respectively. On a final note, the Table showed that generally, the participants were favourably disposed to the integration of ICT into teacher education as indicated by the grand mean and standard deviation (M = 3.43; SD = 13.22).

HO_1: There is no significant difference between the perceptions of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme.

Table 2: Significant Difference in the Perceptions of Full-Time and Part-Time Pre-Service Teachers about the Integration of ICT in Teacher Education Programme.

Var	Studentship	N	Mean	SD	Df	t-Cal	P	Rmk	Dec
Perceptions	Full-Time	200	35.4385	7.62470	368	-2.345	.037*	Sig	Reject
	Part-Time	170	32.5235	1.25560					

* Difference is significant at the 0.05 level.

From Table 2, it is shown that there was significant difference in the perceptions of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme (t-cal = 2.345; df = 98; p< .05). Full-time pre-service teachers appear to have positive perceptions about the integration of ICT in teacher education programme than the part-time pre-service teachers. Thus, the researchers failed to accept the null hypothesis which states that there is no significant difference in the perception of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme.

HO_2: The perceptions of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme do not significantly differ based on gender.

Table 3: ***Significant Difference in the Perceptions of Full-Time and Part-Time Pre-Service Teachers based on gender about the Integration of ICT in Teacher Education Programme.***

Var	Gender	N	Mean	SD	Df	t-Cal	P	Rmk	Dec
Perceptions	Male	150	36.4040	4.93550	368	-.043	.953	Not Sig	Reject
	Female	220	36.7400	8.82716					

* Difference is significant at the 0.05 level.

From Table 3, it is revealed that gender makes no significant difference in the perceptions of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme (t-cal =-.043; df = 368; P > .05). All pre-service teachers, regardless of gender, have positive perceptions about the integration of ICT in teacher education programme. Thus, the researcher therefore, failed to reject the null hypothesis.

DISCUSSION

Finding from the research question shows that there was favourable disposition of pre-service teachers about the integration of ICT into teacher education as indicated by the grand mean and standard deviation (M=3.32; SD=13.22). This finding corroborates some previous studies done in formal higher education settings that documented positive teacher attitudes toward the use of ICT as teaching tools (Brandl, 2015; Le & Le, 2012), but contradicts the finding of Smeets (2017) who stressed that most teachers do not utilize the potential of ICT to maximize the quality of learning environments, which is due to their poor perceptions about ICT utilization.

As regards the first hypothesis, it was shown that there was significant difference in the perceptions of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme (t-cal =-2.345; df =368; P<.05). This finding might not be unconnected with the fact that full-time pre-service teachers have more time and are younger than the older ones in part-time programmes. They perhaps, embrace ICT more than their part-time counterparts

Finally, finding from the second hypothesis revealed that gender makes no significant difference in the perceptions of full-time and part-time pre-service teachers about the integration of ICT in teacher education programme (t-cal =-.033; df =98; P>.05). This contradicts the finding of Prensky (2020), who reported that gender, age and subject teaching are significant in the integration of ICT in teaching practice programme. The findings are dfferent as the findings of this study is specifically based on gender while the latter finding is based on gender, age and subject teaching.

Implications for Educational Policy Makers and Planners

It is very important for educational policymakers and planners before any ICT implementation in education to carefully consider the following:

i. Policymakers should also look at the ubiquity of different types of ICT in the country in general and in the educational system in particular.
ii. Students should be encouraged to embrace technology which will go a long way at making teaching-learning more effective, efficient and meaningful.
iii. Teachers should always be exposed to regular technological updates as regards ICT integration through several on-the-job-training training opportunities.
iv. Hybrid, blended remote form of learning should be practiced as this will ensure regular exposure and usage of technology.
v. Institutional administrators as well as government should find ways of tackling the challenges facing effective ICT integration, especially the irregular power supply and data subscription affordability.

Conclusion

The use of Information Communication Technology can play a number of numerous roles in education by changing the teaching and learning process. However, ICT integration is not easy task to accomplish. There are significant challenges in integrating ICTs use in education rising from environmental, financial, cultural and educational faced by policy makers, educators, educational administrators and students in higher education. For a smooth integration of ICT in teacher training programme, the two colleges of education should introduce a general course for all students on the use of ICT, this will put to fur, the students

that are alien to ICT as well as increase the skills of those that have little knowledge or nothing on the use of ICTs.

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