

Pre-Service Teachers' Assessment of Information Technology Application to Instruction

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Abstract—Technology has moved into the classroom, and it becomes difficult talking of achievement in and attitude to learning without making mention of it. The use of technology makes learning easy, real and practical as it motivates learners, sustains their interest and improves their attitude to learning. This study, therefore examined the pre-service teachers' assessment of information technology application to instruction. The use of technology emphasizes and encourages active learning in the classroom. The study involved 100 pre-service teachers in the selected two (2) Colleges of Education, Nigeria. Purposive random sampling was used in selecting the participants and ex-post facto design was adopted in which there is no manipulation of variables. Two valid and reliable instruments were used for data collection: Access Point ICT facilities and Application of ICT. The study established that pre-service teachers have less access to ICT facilities and Application of ICT in the college, apart from those students having the access outside the college. Also fewer pre-service teachers used ICT facilities on weekly and monthly bases. It was concluded that the establishment of students' resources centres and Campus wide wireless connectivity must be implemented so as to improve and enhance students' achievement in and attitude to learning. The time and attention devoted to learning activities and strategic specialized ICT skills and requisite entrepreneur skills should be increased so as to have easy access to information sources and be able to apply it in teaching process.

Keywords—Computer, ICT Application, Learning Facilities, Pre-Service Teachers.

I. INTRODUCTION

THE world is undergoing a major social and economic change through the new information-processing technology of communications and computers [1]. Information Communication Technology (ICT) is an aid to teaching and tool in the facilitation of learning. It is supplementary to fundamental process of teaching and learning. ICT change the status of instructors from being the repertoire of knowledge to the coordinator of resources [2]. In a traditional classroom situation, the instructor delivers the content to the class and responds to their questions [3].

ICT makes teaching and learning to:

- become student centred,
- give opportunity for students to work independently,
- enable each student to obtain immediate feedback.

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- allow the teacher to meet the individual needs of the students;
- motivate, increase and make teaching and learning to be meaningful;
- bring into the virtual classroom with sense of information, ideas and facts to meet the learners needs inside and outside the classroom.

In contemporary time, the Information Communication Technology (ICT) is the latest innovation in the practice of education. The concept of ICT aided educational practice, involves the use of the computer and computer related facilities as teaching aids in the education of students. The reliance on the Information Technology and its opportunities are steadily on the increase with the development and growth in the Information Communication Technology (ICT) Sector. With every modification in the physical size, memory capacity, weight of the computer, processing speed and accuracy, there is a corresponding increase in its use globally and the education sector inclusive.

II. UTILIZATION OF ICT EDUCATION

In Nigeria, there is an increasing awareness of ICT in teaching and learning. The country has a number of initiatives such as:

- National Policy on Computer Education (NPCE)
- National Policy on Information Technology (NPIT)
- Establishment of National Information Technology Development Agency (NITDA)

Besides, in several sessions of various conferences, seminars and workshops organized for teachers and in-service teachers, ICT often form the theme of discussion and to be included in the in-service teachers curricular. NGO's are not left behind in the efforts to create awareness about the potency of ICTs in the classroom. An example of such NGO's is the e-Learning Network of Nigeria (eLNN), a non-governmental organization promoting ICT in education and training. The efforts by various segments of our society at promoting ICT use in the classroom were affected by different problems and challenges that could hinder effectiveness of ICT utilization in teaching and learning process. One of these challenges is the teacher factors. The teacher is the root of the educational system since the teacher is the moderator of the classroom. The teacher influence the child's learning in the classroom. A teacher is a significant figure in the school environment [4]. Teacher influence learning motivates attitudes and complex skills such as problem solving and original thinking ability of the children through his /her attitude to work.

National Policy on ICT in education [2] emphasized the following objectives to:

- facilitate the teaching and learning process.
- promote problem-solving critical thinking and innovative skills.
- promote long-life learning.
- enhance the various teaching and learning strategies required to meet the needs of the population.
- foster research and development
- support effective and efficient education administration.
- widen access to education and the range of instructional options and opportunities for any-time, any-peace and any-path learning

Therefore, the pre-service teachers need more exposure to ICT, because they are moving into the classroom to exhibit their experiences in order to make learning meaningful. [5] identify the teachers' attitude to ICT use in the classroom and about their readiness for and disposition towards integrating computers into the curriculum. This study focuses on pre-service teachers because some the practicing teachers find it difficult to switch over to the use of ICT in delivery of instruction.

These scholars, [6]-[9] identified some reasons for focusing on the pre-service teachers in Nigeria. These reasons are that:

- some of the present teachers in the classroom are already getting old and approaching retirement age. They may not be enthusiastic about ICT;
- there are so many distractions and responsibilities outside work facing the adult teachers. This includes family and community responsibilities;
- the take home pay given to the teachers cannot take much care of them so they have to look for extra engagement to make more money to make the two ends meet.

On the above reasons, it is therefore imperative to target the pre-service teachers in order to ensure the effective integration of ICT in instructional delivery and to make teaching and learning meaningful. The advent of the information society has called into question many of our assumptions about education. New information and communications technologies are changing the world we live in, and the way we learn to live. ICT changes teaching and learning through its potential as:

- a source of knowledge,
- a medium to transmit content,
- a means of interaction and dialogue [10].

Thus, ICT is both a cause of change and a means of achieving it.

III. APPLICATION OF ICT TO INSTRUCTION

Applications of ICT, such as email, Internet, the World Wide Web and video-conferences, have created many new communication possibilities for school [11]. In a classroom connected to the Internet, communication over distance is simpler than ever before. Communication outside the closed culture of a school can extend cultural understanding beyond the immediate social environment. Learners in one country,

for example, can exchange experiences with learners in another using email or a video-conference. In this case, learners were linked up with an expedition on its way to the North Pole, demonstrating the dramatic possibilities or on-line interaction.

When learners work with ICT, they often work collaboratively in groups or teams. Originating often as a solution to shortage of computers, the experience of group work brings new benefits, by stimulating learners to develop the interpersonal skills necessary for life after school. The ethos is one of working together to solve problems and achieve goals. Each learner has a distinctive role but is fully involved in a common task. ICT give them a means to communicate and to control their communication. The challenge boosts their self-esteem and gives them a sense of power. Relations between teachers and pupils tend, in consequence to change. On-line communication – when a computer is connected to the Internet [10], [11], – inevitably gives control to the user that is the learners learn fast. In the connected classroom the teacher no longer controls what happens, and loses the monopoly of authority.

The teacher becomes facilitator, leader, helper, partner and evaluator, combining the traditional role of subject with that of a manager, through engaging learners in joint endeavour. ICT can help to make the classroom a more inclusive environment. ICT has something to offer most pupils, whatever their individual capabilities. E-mail, for example, offers “virtual mobility” to those who lack physical mobility. A nation's intellectual strength depends on ICTs support. Higher education without the support of ICT makes the lives of learners and teachers equally difficult [12], [13]. The use of ICT in enhancing instructional delivery and promotion of classroom interaction makes learning more meaningful. The quality of an institution's environment for digital information, storage and retrieval has for any discipline, become more important than the institution's conventional library resources in print media .In the early days of computing in Nigeria only the students and the professionals that primarily studied computer science or related courses can interact with computer. Even in the school environment only students from the computer science department are found working with computer. Those in humanities are still of the opinion that computers are scientists machines.

This study therefore seeks to ascertain the access point of pre-service teachers and knowledge in ICTs. The findings of the study would help in determining where to focus attention and resources in the integration of ICTs in the classroom delivery in Nigeria.

Furthermore, it sought to find out teachers' assessment and application of ICT to Instruction.

IV. RESEARCH QUESTIONS

1. Does the Pre-service teacher have access to ICT facilities?
2. What is the level of Pre-service teacher in ICT application to Instruction?

3. Does Pre-service teacher's assessment of ICT have effect in instructional delivery

V. SCOPE OF THE STUDY

This study covers the one College of Education in Ogun State and another one in Lagos State. A total of 100 pre-service teachers were selected for the study. The study is interested in the application of ICT to instruction among the respondents.

VI. SIGNIFICANCE OF THE STUDY

It is hoped that this study will provide pre-service teachers with opportunity of using ICT in instruction, improve their ability to teach effectively and improve learners' learning outcomes. It is expected that through the effective use of ICT in learning, this study will assist and prepare the pre-service teachers as a facilitator and a class instructors to make teaching and learning process meaningful and realize the application of ICT in education. Also it will make the learners to identifying their roles as an active learner, occupying a vital and central position in the learning process. This will also assist pre-service teachers to incorporate the use of ICT into their various courses and as an eye opener to pay more attention to the use of ICT. This study will also enable the government; NGO's to provide funds to tertiary institutions. And make computer, internet and other ICT facilities accessible to secondary schools teachers and the pre-service teachers in tertiary institutions.

VII. THEORETICAL FRAMEWORK

This study has a strong base in two learning theories namely: Stimulus – Response theory of the behaviourist psychology and Getsalt cognitive psychology. Contributors included Pressey 1915, Skinner in 1920s, 1930s up to 1950s and Crowder in 1950s.

VIII. STIMULUS – RESPONSE THEORY

The instruction is based on Skinner's S-R theory. The theory states that "n any unit of activity there is a situation or Stimulus(S) which affects the individual and there is a Response (R)". A stimulus becomes connected with its response by the S-R bond so that on future occasions a repetition of the stimulus will produce the response. Where the probability that R will follow S is high, then the S-R bond is said to be strong [16]. The S-R bonds can be the cognitive, affective or psychomotor activity. Knowledge is such a system of bonds and learning is the process by which bonds are built and structured into systems.

IX. BRUNER'S COGNITIVE THEORY OF LEARNING BY DISCOVERY

The implication of the theory for instruction is that there must be task analysis of the concepts, skills and knowledge to be learnt. Bruner's theory is hinged on learning by discovery. In the context of this theory, discovery is used as all forms of

obtaining knowledge for oneself by the use of one's mental processes. Bruner identified two forms of discovery: (i) when the new content is compatible with what is in the existing structure of knowledge in which case the new content is easily assimilated and (ii) when the new content is not compatible and hence the learner first restructures the cognitive framework so as to accommodate the new content. It was therefore concluded that assimilation and accommodation are two forms of discovery learning. The computer usage is stimulus-centred. In this study the stimuli (that is, the questions) have been structured to stimulate learners to obtain information for themselves through cognitive restructuring. Responses are less overt and more intrinsic to the makes meaningful learning. When a correct answer is given by the learner, it means effective communication or meaningful learning has occurred [14]. The chunks of information must be assimilated and integrated with what the user already knows. Meaningful teaching and Learning contents should be a simple to complex sequence. The learner progresses by responding correctly, receiving feedback (Immediate knowledge of Result, IKR) and moving forward. If a response is incorrect, the learner repeats instruction until there are no mistakes [15]. This allows the learner to set his/her own pace. The technique encourages mastery learning. Mastery learning became revived in the form of programmed instruction in the late 1950s with the aim of providing students with instructional material text which would make them to learn at their own rate and receive constant feedback on the level of mastery [16].

The computer is one of the greatest inventions of the 20th century which has contributed tremendously to the service of humanity [16]. The use of computer in instruction can be traced to the work of Weiner's 'Cybernetics' 1948. Computer-Assisted instruction was first used in education and training during the 1950s [17]. He further noted that early work was done by IBM and such people as Gordon Pask and Moore, but CAI grew rapidly in 1960s. Gordon Pask was the first to systematically apply cybernetics principles to education with the introduction of 'adaptive teaching systems.

X. METHODOLOGY

A. Research Design

This study adopted the ex-post facto design in which there is no manipulation of variables.

B. Selection of Participants

The participants for the study were made up of 100 pre-service teachers from two state Colleges of Educations in Ogun State and Lagos State, Nigeria. These are: Tai Solarin College of Education, Omu-Ijebu, Ogun State Nigeria and Adeniran Ogunsanya College of Education, Ijanikin, Lagos State, Nigeria. Participating pre-service teachers were randomly selected in the two Colleges of Education.

C. Research Instruments

The following research instruments were developed and used for the study; 1. Access Point to ICT Facilities (APICTF), 2. Application of ICTs (AICT).

1. Access Point to ICT Facilities (APICTF)

This was designed to measure the pre-service teachers' Access Point to ICT facilities. The instrument consists of two sections. Section A is on demographic information and section B dwells on Yes or No options tailed towards pre-service teachers' access point of exposure to ICT facilities, designed by the researcher.

2. Application of ICT (AICT)

This instrument was adopted from [17] Computer Research in Higher Education tailed towards students' application of computer in instruction. It consists of a 4-point Likert scale type response (Strongly Agree, Agree, Disagree and Strongly Disagree and Strongly Disagree) was used with Twenty-five questions on students' application to ICT in teaching and learning.

XI. VALIDATION OF THE INSTRUMENT

The instruments was prepared and presented to peers and experts in ICT in the Tai Solarin University of Education, Ijagun, Ogun State and University of Lagos, Nigeria, for face and content validity. Cronbach alpha was used for reliability test. This yielded a reliability coefficient value of 0.73. This implies that the test is reliable and is neither too simple nor difficult. The score ranged from 4 to 7 out of maximum score of 10.

XII. DATA ANALYSIS

Collection, compilation and processing of data to describe and interpret the reality of actual perceptions skills, knowledge and training needs of this focus group were collected. The result was subjected to descriptive analysis in order to provide a global perception on general access to ICTs facilities and knowledge in ICT. Frequency, means, standard deviations and percentages were also used in the analysis

XIII. RESULT

The results are presented in relation to the three research questions formulated.

1. Research Question 1: Does the Pre-service teacher have access to ICT facilities?

TABLE I
ACCESS POINTS OF PRE-SERVICE TEACHERS TO ICT FACILITIES

Access Points	Frequency	Percent
School	12	12.0
Lecturers' Office	44	44.0
Mobile phones	20	20.0
College Library	12	12.0
Cyber Cafes	52	52.0
Total	100	100.0

Table I shows that there are 52% of pre-service teachers that has access to ICT facilities from cyber cafes. 20% access from the mobile phones while 12% access to ICT facilities in school ICT cafe and college libraries. And 4% access ICT facilities from lecturer offices. Therefore this revealed that

pre-service teacher have not really have access to ICTs facilities in the school that can improve them.

TABLE II
LEVEL OF STUDY OF THE PRE-SERVICE TEACHERS

Level of Study	Frequency	Percent
100	26	26.0
200	44	44.0
300	30	30.0
Total	100	100.0

Table II shows that there are 26.0% of the pre-service teachers in 100 level, 44.0% in 200 level and 30.0% in 300 levels.

TABLE III
DEPARTMENT OF THE STUDENTS

Department	Frequency	Percent
Tec/Voc	29	29.0
Science	27	27.0
Arts	44	44.0
Total	100	100.0

Table III shows there are 29.0% from school of Vocation and Technical. 27% in the school of Science, while 44% in the school of Arts Social Science. This implies that larger pre-service were admitted into other department. The learners feel that they cannot have encounter with ICT.

2. Research Question 2: What is the level of Pre-service teacher in ICT application to Instruction?

TABLE IV
LENGTH OF TIME OF USING ICT FACILITIES

Time(Months)	Frequency	Percent
Less than 6	44	44.0
7-12	24	24.0
13-18	12	12.0
19-24	12	12.0
24 and above	12	12.0
Total	100	100.0

Table IV shows that 44% of the pre-service teachers were using ICT facilities less than 6 months, while 24% used it for 7-12 months. Also, 88% students used ICT facilities for 13 to 18months and 12% of the respondents used it for 19-24 months and above respectively. This shows that the pre-service teachers were not frequently using ICT facilities.

TABLE V
POSSESSION OF E-MAIL ADDRESSES

Response	Frequency	Percent
No	8	8.0
Yes	92	92.0
Total	100	100.0

Table V shows that there are 92% pre-service teachers that possessed e-mail address, while only 8 had none. This implies that the pre-service teachers used ICTs facilities only outside the school.

TABLE VI
FREQUENCY USE OF E-MAIL

Freq (per week)	Frequency	Percent
None	64	64.0
Once	32	32.0
Thrice	4	4.00

Table VI shows that 4.0% of the pre-service teachers used e-mail thrice a week, 32.0% used e-mail once a week, while 64.0% do not use e-mail at all. This revealed that the pre-service teacher had no access to ICTs facilities in the school environment.

TABLE VII
POSSESSION OF HOME-BASED E-MAIL FACILITY

Response	Frequency	Percent
No	92	92.0
Yes	8	8.0
Total	100	100.0

Table VII shows that only 8.0% of the respondents have e-mail facilities in their home, while 92.0% none. This revealed that 92% of the pre-service teachers can apply and use ICT frequently.

TABLE VIII
FREQUENCY OF STUDENTS' SEARCH OF THE INTERNET

Frequency (per week)	Frequency	Percent
Less than 1 hour	84	84.0
1-3 hours	12	12.0
7-9 hours	44	44.0
Total	100	100.0

Table VIII shows that there are 84.0% of the pre-service teachers that used internet for less than one hour in a week, 12.0% used internet in a week for between 1-3 hours a week, while only 4.0% spent between 7-9 hours used internet in a week.

TABLE IX
AVAILABILITY OF COLLEGE WEBSITE

Response	Frequency	Percent
No	44	44.0
Yes	56	56.0
Total	100	100.0

The percentage of availability of the Website for the use of the pre-service teachers shows 56% while 44% revealed none for the pre-service teachers, this shows not all the respondent have access to ICT in their colleges.

3. Research Question 3: Does pre-service teacher's assessment of ICT have effect in instructional delivery?

TABLE X
PRE-SERVICE TEACHERS' APPLICATION TO ICT

Scores	Frequency (No of Students)	%	X
4	12	12.0	5.46
5	28	28.0	
6	40	40.0	
7	20	20.0	
Total	100	100.0	

From Table X, the scores of pre-service teachers' application of ICT ranged from 4 to 7 out of a maxims score of 10. The distribution of the scores shows that 12.0% scored 4 marks; 28.0% scored 5 marks. And 40.0% scored 6 marks, while 20.0% scored 7. The mean score for all the 100 students is 5.46 which indicate that the level of the students in ICT is average.

TABLE XI
COLLEGE PLAN TO DEVELOP WEBSITE IN THE NEAREST FUTURE

Response	Frequency	Percent
No	92	92.0
Yes	8	8.0
Total	100	100.0

Table XI shows that there are 92.0% responded that their colleges do not have any plan to develop website in the nearest future while only 8.0% responded that their college has such plan.

XIV. DISCUSSION

The results seem to confirm studies that pre-service teachers' assessment and application of Information Technology are useful tools in Instruction. For their grater proximity to the educational process, teachers are clearly defenders of the use of ICT in Instruction. As shown in various studies, particularly in the survey conducted by [18], [19]. These studies revealed that ICTs facilities fostering learning and as an effective tool in teaching and learning. The result also revealed that ICT constitutes a valuable educational tool and a way to facilitate learners.

Almost all the respondents revealed a frequency access points of pre-service teachers to ICTs facilities is not encouraging with the school apart from the cyber café and mobile phones. Research shows that only 12% of the pre-service teachers has lengthen time using ICTs facilities, while 65% has no frequency use of e-mail, 32% with once per week, and 4% thrice per week access. Fewer pre-service teachers have low frequency to search the internet and the application of in ICTs mean score for all the 100 participants was 5.46%. This indicates that the level of the pre-service teachers in the use of ICT is not encouraging. Therefore it needs more attention

The study established that pre-service teachers have less access to ICTs and application of ICT facilities in the school apart from those students having the access outside the school. Pre-service teachers play vital role in the implementation ICT in classroom Instruction. Their technical and pedagogical training in the use of ICT in today's classrooms can constitute a barrier or adjustment for an innovative and supporting use of ICT in the classroom [20]-[22]. And more importantly, it must be consider that a correct educational implementation of ICT strongly depends on the pre-service teachers and the capacity of ICT facilities available for their use. ICT has potentials to empower students, promoting facilitating the full apprehension of their educational background, developmental process and improve teaching and learning process. ICT will make relationships between teachers and students more interactive

and guiding, rather than transferring information from teacher to student

XV. RECOMMENDATIONS

- Pre-service teachers should demonstrate a greater spontaneous interest in a learning activity.
- The time and attention devoted to learning activities should be increases when Pre-service teachers use ICT, to develops their interest and increase the sources retrieving information.
- The establishment resources centres and campus-wide wireless connectivity should be established.
- Improving Computer acquisition scheme for staff and students.
- Provision for alternative power supply.
- Strategic and specialized ICT skills and requisite entrepreneur skills among staff and students.
- Acceleration of the implementation of ICT policy to all Colleges of Education in Nigeria
- Financial Support and Supply of ICT tools to schools through Tertiary Education Trust Fund (TEF-FUND), UNICEF, National Commission (NCCE) and other NGO's to tertiary institutions.
- Technological tool or device to achieve it purpose, Pre-service teachers should be skilful technological and carefully select the technology device that will enhance their ability.
- Establishment of national ICT awareness machine.
- Building of a critical mass of ICTs proficiency and competences in tertiary institutions.

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