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TECHNOLOGY ADOPTION IN TEACHER EDUCATION: A PATHWAY TO ACHIEVING SUSTAINABLE DEVELOPMENT GOALS (SDG-GOALS) IN NIGERIA EDUCATIONAL SYSTEM

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Abstract

This paper discussed Technology Adoption in Teacher Education: A Pathway to Achieving SDG-Goals in Nigeria Educational System. It is a glaring belief now that, the growth in access to Information and Communication Technology has brought about massive changes in many sectors within the society, including education. This is so because, technology is seen as integral part of our everyday lives, and consequently it must also form an essential part of all classroom functions. Based on the foregoing, the paper explores secondary sourced data from print materials and online journal and article. Therefore, the paper discussed Components Structure of Teacher Educational Practice in Nigeria, and these were: Pre-primary teacher education; Primary teacher education; Secondary teacher education; Higher education programmes and Vocational Teachers Training. Similarly, it enlisted and explained technology that could be adopted for the programme which include Communication Atenea: Global School Leader., Inspiring Teachers Peer Coaching Platform; Lead Now and Perform Ed among others. Moreso, the paper treated Teacher education programme and technology adoption Process were the concept of Inservice and Pre-service as teacher education programe are elaborated upon. Lastly, Conclusion and recommendations were made and these are: Instructional designers and teacher educators should consider the packaging of learning materials and making them available as e-books or e-materials that could easily be accessed and read through handsets and other devices. Similarly,

Teacher educators should develop highly interactive applications particularly blogs and group emailing services that can help effectively exchange instructional ideas and give every student equal access to learning materials.

Keywords: Technology, Adoption, Teacher, Education & Panacea

Introduction

Globally, there is a rapid growth in access to information and communications technology, developing countries are not excluded. This is because developing countries have indeed experienced tremendous growth in access to information and communications technology which was a good development. This growth in access to information and communications technology has brought about massive changes in many sectors within society. For example, in Nigeria, the government (Federal, State, and Local) and stakeholders in education have devised means to revamp the country's education with technology access at all levels (Garba & Alademerin, 2014). Technology adoption is usually modeled as a process with dynamic transitions between costs and benefits. Nevertheless, school teachers do not generally make effective use of technology in their teaching. The adoption of technology by teachers to facilitate and support the teaching–learning process in the classroom is expected to have a great impact on the quality of the teaching experience (Ibrahim, 2019: Roberto & Miguei, 2013).

Therefore, education has been seen as a source of sustainable development in many countries in the world unfortunately, even though it is a potent weapon for measuring a country's development, it has suffered setbacks resulting in poor quality education. Quality Education is a significant prerequisite for developing every country's one of the United Nations' sustainable development goals. According to the United Nations, every child is entitled to quality and accessible education equipped with skills useful for their future development. For a child to enjoy quality education regarding the United Nations Sustainable Development Goals, technology is necessary. Technology in education has helped solve many problems, making life-learning processes enjoyable and exciting for every child to learn. The adoption of technology in education comes with many advantages embedded in improving communication and research (Easther. et.al, 2021).

Teacher Education can simply be seen as programs deliver generations of teachers, who in turn educate generations of pupils and students, who on their part carry with them and transform the knowledge and skills acquired in school, college, or university during the rest of their lives and work. Hence, it equally refers to professional education of teachers towards attainment of attitudes, skills and knowledge considered desirable so as to make them efficient and effective in their work, in accordance with the need of a given society at any point in time.

Therefore, teacher education evolved from normal schools and colleges to universities. This evolution aimed to attract better students, improve the context for research, and develop new and more innovative programs for teacher preparation. Currently, teacher education is under criticism; a sense that teacher education has failed to achieve the place it should in the improvement of teaching pervades these criticisms. Consequently, change can be found occurring in most countries, ranging from the restructuring of teacher education by policymakers to ground level reform initiated by small groups and institutions. The policy directions vary as well, from a shift of teacher education to the schools, increased teacher testing, and an emphasis on academics. The ground level reform seeks to provide new approaches to the common, traditional organizational model of teacher education, which focuses on providing beginning teachers with knowledge and skills through coursework. They engage teachers with various strategies, which equip them to learn on the job over time. Both teacher educators and prospective teachers are confronted with new challenges, especially in urban settings where an increasingly homogeneous teaching force interacts with an increasingly heterogeneous student population (Brouwer, 2010; Howey & Wideen, 2010).

Components Structure of Teacher Education and Practice in Nigeria

Teacher education typically Consists of four main components: general education, subject-matter preparation, general professional education, and specialized professional education in each subject matter. Teacher education or teacher training refers to programs, policies, procedures, and provision designed to equip (prospective) teachers with the knowledge, attitudes, behaviors, approaches, methodologies, and skills they require to perform their tasks effectively in the classroom, school, and wider community. The professionals who engage in training the prospective teachers are called teacher educators (or, in some contexts, teacher trainers). There is a longstanding and ongoing debate about the most appropriate term to describe these activities. The term 'teacher training' (which may give the impression that the activity involves training staff to undertake relatively routine tasks) seems to be losing ground, at least in the United State of American (USA) to 'teacher education' (with its connotation of preparing staff for a professional role as a reflective practitioner). The two major components of teacher education are in-service teacher education and pre-service teacher education (Brouwer, 2010; Howey & Wideen, 2010).

Following this line of development, it is important to note that, any country that wishes to sustain its educational system must know what contribution teacher education programs make to the availability and employability of its teacher workforce. Like no other component of a country's education system, this is because it possesses a multiplier function for the quality of schooling

and learning throughout the system as a whole. The programs sector delivers generations of teachers, who in turn educate generations of pupils and students, who on their part carry with them and transform the knowledge and skills acquired in school, college, or university during the rest of their lives and work. Indeed, the contributions that it would give a great productivity to the country's educational system which is too eminent to despise (Brouwer, 2010; Howey & Wideen, 2010).

From the foregoing, it has been established that there are five major forms of Teacher Education Programme in Nigeria and these are:

1. Pre-primary teacher education.
2. Primary teacher education.
3. Secondary teacher education.
4. Higher education programmes.
5. Vocational Teachers Training.

Similarly, it is worthy to note that, according to the Federal Government of Nigeria (NPE:2013), the goals of teacher education are as follows:

1. Help teachers to fit into social life of the community and the society at large and enhance their commitment to national goals.
2. Provide teachers with the intellectual and professional background adequate for their assignment and make them adaptable to changing situations & innovations.
3. Enhance teachers' commitment to the teaching profession.
4. And above all, ensuring teaching-learning process goes with modern globalization which anchored on the use of technologies to supports and improve on the instructional process in schools (Revised Six Edition, NPE-2013).

According to Ogunyinka, et al; (2015) the practice of teacher training in the country has the following two stages:

1. Pre-service and
2. In-service

The first component or stage is more in vogue than the second stage of teacher training due to students enrolling for learning experiences in programmes domiciled in Teacher Training Colleges, Colleges of Education and Faculties of Education in universities in the country. As for the second stage, it is passively practiced with only teachers' enrollment in sandwich programmes serving to form a major part of in-service training. It is as a result of the above that makes expert in teacher training program to clamored for the following stages of teacher education in the country as;

1. Pre-service
2. In-service and
3. Continuous professional development

It is in line with the clamoring that led to the emergent of three stages which the Innovative Teacher Training Model (ITTM) proposed as presented in Figure 1. The model is made up of four (4) modules with their attendant elements. The model's cyclical design with the arrows linking the modules meaning the path which an active individual should follow from being a prospective teacher (pre-service) to the point of retirement from active services as a teacher. The dotted line between in-service training and pre-service training implies that teachers from in-service training do not go back for pre-service training. Rather, they serve as a source through which the prospective teachers gain requisite knowledge, attitude and skills required for the teaching profession (Obiunu, 2015: Odu, et, al: 2013 and Ojo, 2014)

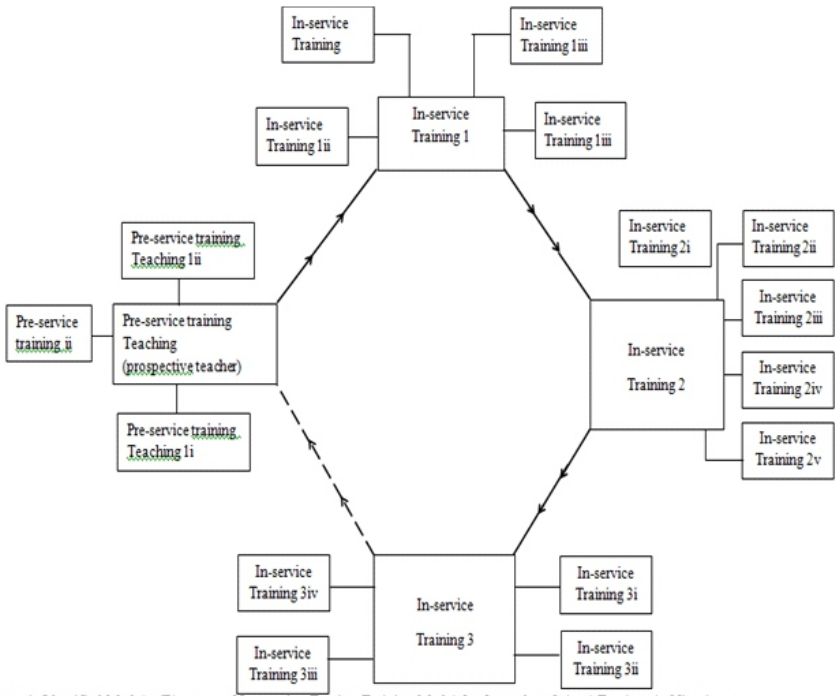


Figure 1: Identified Modules/Elements of Innovation Teacher Training Model for Secondary School Teachers in Nigeria

Figure 1: Identified Model Element of Innovation Training Model for Secondary School Teacher in Nigeria

Furthermore, Education for All (EFA) has been a popular slogan and has been given attention through different international development courses ever since 1990. It was considered critical at the inception of the Sustainable Development Goals (SDGs) and tagged SDG 4 which education is seen as a force for sustainable development, nation-building and peace. Children and young

people who gain certain skills such as reading, writing, or counting are more likely to have a better future than their peers who lack these skills. The world is changing, and globalization requires the world population to quickly adapt and learn to work with newer technologies. The role of education in ensuring sustainable development is not limited to developing regions, but the whole world at large. The major aim of Sustainable Development Goal 4 (SDG 4) is to provide an inclusive and high-quality education that will improve the learner's standard of living and the community's future (Abanikannda, 2011: Ashimole,2011: and Guzman, et al: 2009).

Major progress has been made in promoting access to education, specifically at the primary school level, for both boys and girls. It was observed that Sub-Saharan Africa countries experienced an increase in primary education completion rate from 49 percent in 2000 to 60 percent in 2006 However, increased access does not always translate to improved quality of education or completion of primary school. During the implementation of the MDGs, increment in school enrolment did not translate to improved educational outcomes as 1 out of 4 countries still failed to meet the minimum math proficiency standards. At the end of 2019, there were still millions of children that were out of school. The closure of schools in 2020 as part of the measures taken to slow the spread of COVID-19 is having an adverse impact on the learning outcome. It has affected more than 90 percent of the world's student population, with an estimated 1.5 billion children and young people having disrupted access to education. Across the world, limited access to the internet has also adversely impacted students' ability to engage in learning opportunities. It is estimated that at least a third of the world's children do not have the technology they need to participate in remote learning during the COVID-19 pandemic and the resulting widespread school closures. The pandemic has also resulted to an increase in educational inequalities with a completion rate of 79% for the well off and 34% for the poor households (Baba, 2018).

Therefore, Sustainable Development Goal 4 (SDG 4 or Global Goal 4) is about quality education and is among the 17 Sustainable Development Goals established by the United Nations in September (2015) The full title of SDG 4 is "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" SDG 4 has ten targets which are measured by 11 indicators. The seven "outcome-oriented targets" are: free primary and secondary education; equal access to quality pre-primary education; affordable technical, vocational and higher education; increased number of people with relevant skills for financial success; elimination of all discrimination in education; universal literacy and numeracy; and education for sustainable development and global citizenship.Therefore, the three means of achieving targets are: build and upgrade inclusive and safe schools; expand higher education scholarships for developing countries; and increase the supply of qualified teachers in developing countries.

SDG 4 aims to provide children and young people with quality and easy access to education plus other learning opportunities. One of its targets is to achieve universal literacy and numeracy. A major component in acquiring knowledge and valuable skills in the learning environment. Hence, the urgent need to build more educational facilities and also upgrade the present ones to provide safe, inclusive, and effective learning environments for all. The prevalence of extreme poverty, insurgency, communal conflicts, and other factors has significantly reduced the progress in many developing countries. Children from poor households have a higher probability of dropping out of school than their counterparts from rich backgrounds (Abanikannda, 2011: Ashimole,2011: and Guzman, et al: 2009).

Technology that Could be Adopted into Teacher Education Programme

Teacher educators and indeed the education systems are facing the daunting challenges of delivering effective and continuous professional development teaching-learning process by teacher educators and as well students. Therefore, delivering on this promise is very tasking and challenging in the light of the current learning crisis especially in a low-resource context. Teachers must adopt their teaching strategies to suite present realities of technology adoption in teaching process. This became very important because the current existing mode of teaching through either distance learning or blended learning models demand technology adoption. It was based on this fact, the following were identified as some of the technology that could be adopted in teacher education programme (Technology for teaching, 2022)

I. Communication Atenea: is a social network born during the pandemic that provides an avenue for teachers to collaborate digitally. With the main goal of improving teachers' digital pedagogical skills, Comunidad Atenea has adopted the latest trends to reach more than 50,000 unique individuals from over 100 countries in just one year by utilizing the Zoom, YouTube livestreaming, and WhatsApp.

ii. Global School Leader: This was equally and quickly adapted its program during the pandemic to create bite-sized learning modules that provide principals with practical advice on how to facilitate remote instruction and learning. The non-profit designed these modules with principals in mind, sharing the modules via the internet for those with access and delivering it in person for those without internet access.

iii. Inspiring Teachers Peer Coaching Platform: This is used to connects volunteer teachers based in U.K. and U.S. originally, to train and mentor teachers in LMICs. The initiative is now gaining ground in Africa and Nigeria is one of the countries demonstrating this strategy for teaching.

iv. Lead Now a Nairobi-based non-profit organization that offers an online and blended delivery model, supporting teachers and principals via phone, online feedback, group WhatsApp sessions, and videoconferencing is now becoming recognized, this is because users can engage in virtual communities of practice with his students wherever they are, whether in the school or outside.

v. PerformEd: Is operating at a national scale in Egypt, is Point of Learning system that focuses on changing teachers' behaviors through a feedback and reflection cycle. In any given application, the program first conducts a survey to understand teachers' skills and internet access, enabling trainers to focus on teachers' needs so that they can provide effective support on an ongoing basis.

vi. Profuturo Digital Education: is a non-profit that provides teacher training at scale with nearly a million users worldwide. In addition, the program also provides learning resources for primary school children through a digital learning platform, technical support to teachers, and a monitoring and evaluation system to continuously assess effectiveness of the program.

vii. Peuntes Education is a non-profit with a holistic program that engages teachers, principals, families, and community stakeholders through in-person trainings and digital outreach. The program focuses on building 21st century skills and aims to foster students' creativity, collaboration, and critical thinking skills across Latin America (Technology for teaching, 2022).

Justification of Technology Adoption into Teacher Education in Nigeria

Technology adoption into teacher education program would undoubtedly goes a long way in encourage achieving all the SDG-Goals in Nigeria context and this would be possible because of the existing basis in the policy document. The Federal Ministry of Education is charged with policy formulation, monitoring of implementation, setting, and maintaining standards in the Nigerian education sector. However, the Constitution places education on the Concurrent Legislative List, making education a shared responsibility of the Federal, State and Local Governments. Thus, while the policy and standards with regards to technology adoption and other related ICT in education are the responsibilities of the Federal Government, the implementation of these in education rests heavily on the State and Local Governments. ICT as a generic term occupies a very strategic place in Education in the country. This is encapsulated in the Ministerial Strategy Plan: Education for Change and in series of initiatives and strategies targeted at integrating technology ICT bizarre into educational process. In all these documents, it was emphasized that, technology

would serves as a support structure for all of the 17 Sustainable Development Goals (SDGs), helping in bringing about their advancement towards meeting targets, especially the universal coverage of basic services in the areas of education, health finance and energy. (Federal Ministry of Education, 2019: & Ife, 2020).

Similarly, Nigeria's development partners advocate and seeking the adoption and use of technology to meet the targets of the sustainable development goals during the coronavirus pandemic especially considering the new target agreed upon by all nations. They made this known in one of their webinar series on 'Achieving Sustainable Development in Nigeria: Leveraging Technology'. The experts noted that the pandemic had slowed down the progress of the SDG targets in Nigeria because containment measures introduced by the government disrupted the movement of people and global supply chains that were crucial to the delivery of humanitarian assistance (UNICEF,2022).

Teacher Education in NPE & Expectations of SDG-4 in Nigeria System of Education

The State of Teacher Education in Nigeria National Teacher Education Policy of Nigeria, in her most recent revised six edition (NPE & FME, 2013) made some bold analysis of the state of teacher education in the country, and the policy made it clear that it was relying on research it commissioned on the sub-sector. Therefore, the policy emphasis that it is requiring attention from teacher educators if meaningful contribution to achieving the goals of the SDG through National Policy on Education will becomes realistic.

These areas are (FME, 2013, Sect. 2.0):

i. The need for updating of recruitment, admissions, and graduation requirements.
ii. Incentives and measures for attracting talents into the teaching profession.
iii. Pre-Service Teacher Education (PSTE) course content at both NCE and Bachelor's degree levels fall below the requirements of today's knowledge economy;
iv. Inadequate coverage and mastery of content knowledge in 'teaching subjects' especially in Languages, Sciences, Mathematics and Technology.
v. The prevalence of memorization-regurgitation due to the predominance of the lecture method of teaching;
vi. Inadequacy and inappropriateness of teaching and learning materials, and
vii. Low level of information technology penetration and utilisation (Nasir, 2018)

The policy also faulted the poor conduct of the teaching practice exercise regarding its short duration, limited or lack of classroom observation before teaching practice, low quality of lesson preparation and delivery, and absence of formal induction exercise for student teachers before

their involvement in the teaching practice exercise. Furthermore, the policy noted that a good number of teacher education institutions operate with dilapidated infrastructure, overcrowded lecture halls, and insufficient equipment and materials. Students also receive little or no support in the form of scholarships, medical care, and counselling services has a legitimate reason for focusing on teacher education, it is worthwhile to remember that the challenges listed above are common to all forms and levels of education in Nigeria including higher education (to which teacher education now belongs almost exclusively). A one-time Executive Secretary of the National Universities Commission (NUC) Prof. Peter Okebukola summed up the situation of higher education in Nigeria as one of massive explosion in student enrolment, increasing numbers of prospective new entrants in the face of inadequate and obsolete infrastructure and equipment, inadequate academic staff in terms of both numbers and quality, lack of relevance of academic programmes and low quality of graduates, as shown by many studies supported by the World Bank and the Needs Assessment Survey of the NUC in 2004 (Okebukola, 2006).

Based on the foregoing analytical explanations can be deducted that, in order to achieving SDGs in Nigeria, and following the conceptualization of the role of education generally to the achievement of the SDGs contained in various proclamations of the United Nations on the subject emphasized two main aspects as thus:

1. That one, the promotion of an improvement in the quality of education that makes possible the development of the citizens of the relevant knowledge, skills and values they need to improve the quality of their lives;
2. Reorienting the curricula at all levels (from pre-school to university such that education is rethought and reformed as a vehicle for the development of the knowledge, thought patterns and values that building a sustainable world requires. In other words, for teacher education to make significant contributions to the goals of SDGs, it should be of sufficient quality itself so that it is capable of producing teachers with the relevant knowledge (Baba, 2018: & Okebukola, 2006).

Earlier before now teacher education has been structured to orient and sensitize the teacher to distinguish between developmentally appropriate and detrimental uses of technology, that the primary needs is to equip teachers with competence to use the appropriate ones for their own professional development. In view of the above discussion the newly visualized teacher education program will now be as put forth by as follows;

i. Teacher Education Program Emphasizes learning as a self-learning participatory process taking place in social context of learner's as well as wider social context of the community and to the nation.

ii. Puts full faith in self-learning capacity of school children and student teacher and evolving proper educative programme for education.
iii. Views the learner as an active participative person in his own learning. process, with the use of adopted technology
iv. His/her capabilities or potentials are seen not as fixed but capable of development through experiences and view the teacher as a facilitator, supporting, encouraging learner's learning.
v. With the use of technology, does not treat knowledge as fixed, static or confined in books but as something being constructed through various types of experiences which is created through discussion, evaluate, explain, compare and contrasts i.e., through interaction. Emphasizes that appraisal in such an educative process will be continuous process
vi. Ensure a major shift; from teacher centric, to stable designs to learner centric which the technology permit the flexibility needed . (International Encyclopedia of Education 2010).

Teacher Education Programme and Technology Adoption Process

It is glaring fact that, socially, politically, and economically the world is changing at a dramatic rate. Hence, it is certainly not possible to foresee any slowing in the pace over the next decade. As the world changes, so has the school, and so has what we mean by teaching-learning equally changes. The teacher-student relationship is far more complex and demanding than ever before and the implication of this is a more diversified role for the teacher is what impelled a new view of the process of teacher education and training. Thus, teacher education is seen as a continuous process, beginning with a phase of initial training, and continuing throughout the teacher's professional life throughout regular and sustained periods of in-service training. Teacher education generally includes four elements: improving the general educational background of the trainee teachers; 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. The balance between these four elements varies widely (Education, 2011; Moon, 2010; Perraton, 2010).

Teacher education is an important training program in any educational setup. It deals with procedures, provisions, and policies, to make candidates learn and gain knowledge about various concepts. They get trained to equip themselves with the best teaching skill, knowledge, attitudes, and behaviors which are required to perform effectively in any learning environment like in a classroom setting or school system. Teacher education helps the teachers to learn how to

deal with the students and make them learn effectively. It is an ongoing process as the sector is always evolving and new effective ways of teaching keep emerging. Under teacher education, the teachers can be trained on modern concepts and ideas to expand their boundaries of knowledge and adapt to the new learning environment. For example, with the advancing technologies, they are trained on e-teaching and virtual learning methods by teaching them how to handle the technologies and tools for effective teaching. When it comes to teacher education, there seem to be several distinct components of it, while the two major ones include pre-service education and in-service education. In pre-service education, the candidates are being educated before they have undertaken any teaching. Alternatively, in-service teacher education refers to education given to candidates that have already begun teaching. The way the education is carried out is usually a subject of political discussion in several nations, which showcases both the value attached by different cultures and societies to prepare young people for their life. This education is an important element of any education system, which must be reviewed for effectiveness. (Teachmint,2023).

In-service teacher education: It is well known fact that knowledge is increasing day-by-day and so rapidly. It was once said that knowledge becomes just doubled after a decade. Therefore, in every field of knowledge new ideas, trends, principles and theories are emerging every day. In other words, the teacher education programme aims at providing knowledge, understanding of theories, principles, law, facts and others regarding teaching activity to the prospective teachers. These teachers go into the field and apply the given knowledge in their professional life. But after a period, their knowledge becomes absolute as the knowledge in the field of teacher education is also increased day-by-day. Hence, education may be defined as continuing education of teachers and other educators which commences after initial professional education is over and which leads to the improvement of professional competence of educators all throughout their careers (Prakash, 2015).

Pre-service teacher education: The professional training undertaken by teachers before their joining in the service as teachers is known as pre-service teacher education. People desiring to adopt teaching as their profession, are called upon to undergo and complete such pre-service training as they acquire necessary knowledge and skills that are necessary for improving their competence as teachers. The course of studies and curriculum content were well developed and transacted during sessions scheduled for the purpose. On completion of the course of studies, the student or pupil teacher are required to appear at the final examination and those who are found successful on the basis of their performance examinations are given certificates or degree or diploma and they becomes eligible for

entering into the teaching jobs according to their general and professional qualification (Prakash. 2015).

Conclusion

The theoretical paper has dealt so extensively with justifications that, for SDG+Goals to be achieved in her new target year of (2030), more needs to be done and indeed more seriously in Nigeria educational system. The target which discussed Inclusive and quality educational delivery before this year will be a mirage if teacher educators are reluctant in the adoption of technology into the component. Although, Both NPE-2014 and document by federal government (FGN-2019) on the Integration of Information and communication technology were there as a guide for operationalization, what remains is the commitment by all stakeholders to ensure success.

Recommendations:

The following recommendations are put-forth for the improved adoption of technology into teacher education programme:

I. There should be a shift in focus and themes of researches, conferences, seminars and workshops to give attention to write around technology adoption in teacher education because it is an outlet of knowledge dissemination.

ii Equip skill in typewriting skills should be a standard for all student teachers and teacher educators and the ability should transcend the use of the computer to the use of the telephone handsets and related technological tools;

iii. Instructional designers and teacher educators should consider the packaging of learning materials and making them available as e-books or e-materials that could easily be accessed and read through handsets and other devices;

iv. Teacher educators should develop highly interactive applications particularly blogs and group emailing services that can help effectively exchange instructional ideas and give every student equal access to learning materials;

v. Teacher educators should use their blogs and group emailing services to develop a database of all students that pass through their courses, and to keep a record of the career progress of such graduates;

vi. Efforts should also be geared towards research and innovation that could lead to the production of more affordable but reliable computers and alternative sources of energy,

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