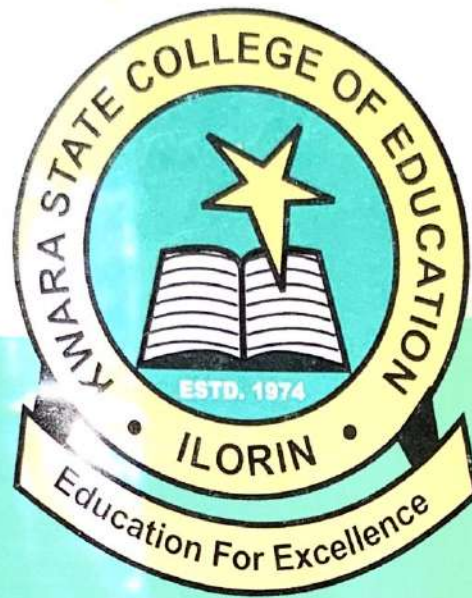


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**INTEGRATING ICT TRAINING CERTIFICATION PROGRAM INTO
PRE SERVICE SCIENCE TEACHERS' EDUCATION IN NIGERIA
TEACHERS' TRAINING COLLEGES**

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Abstract

Education is a fundamental human right as enshrined in the Constitution of the Federal Republic of Nigeria. Thus, the country has long attached paramount importance to education as the main vehicle for nation building and sustainable development and invested in the provision accordingly. The Government through Ministry of Education is progressively expanding the education system so as to provide equitable access and quality education for all citizens. After having recorded significant expansion in the access, Nigerians sciences teachers is confronted with the task of improving student learning with substantial investment in developing, managing and professionalizing the teaching force. Science Teacher Education addresses 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 society at any point in time. Pre-service teacher education and In-service teacher education going on in our colleges of educations is the two main avenues of becoming a qualified, competent teacher in Nigeria. This study aimed at assessing training needs that would enable successful integration of ICT skills Certification into Pre

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services Science teacher education curriculum in Nigeria Pre –Services Teachers Colleges of Education, so as to sustained the use of ICT resources and skills leant to better the teaching and learning conditions when they finally found them self in the classroom. The writer is of this paper is of the opinion that Pre-Services science teachers have the initial O'Level Results requirements to be enrolled into neither Certificate in Computer Operations or Diploma in Computer Science in their Respective Colleges if such educational training and services were to be provided to the Pre-Services Teacher. Furthermore the writer also noticed that most of all the colleges of education in Nigeria where the pre-services science education teachers were undergoing their teachers education training have a computer and information technology centre s where ICT services and other computer educational Resources related services are been render. This ICT centre can also serves as a training centre's 'for the science education pre-services teachers. The training certification can run concurrently with their teacher educational training. This implies that at the end of their science education training, each pre service teacher will be certified in the proficiency use of ICT geared toward improving teaching and learning of subject in their respective field using ICT.

Keywords: Integrating, ICT, Training, Teachers and Certification.

Introduction

Information and Communication Technologies (ICTs) can be describe are the combination of networks, hardware and software as well as the means of communication, collaboration and engagement that enable the processing, management and exchange of data, information and knowledge. The rapid development in ICTs has made tremendous changes in the twenty-first century, Information and communication technology (ICT) has the potential to transform teaching and learning processes. However most countries face challenges in measuring the impact of investments in infrastructure, massive roll outs of teacher training initiatives, and usage in the classroom. The lack of a comprehensive set of indicators can partly explain current challenges. Moreover, there is a growing recognition that added focus is needed to measure Teacher training and usage holistically with in a systems perspective whereby indicators are not viewed in isolation but reflect a complex pattern of how teachers are prepared and how teaching activities with pupils, in and out schools and the classroom are executed. As information and communication technology (ICT) plays a greater role across society including public and

private education, countries around the world are more than ever in need of high quality internationally comparable statistics on ICT in education. In particular, indicators are essential for measuring and tracking.

The integration of ICT and its impact given investment can constitute a significant portion of national education budgets, for many, if not most countries International ICT in education assessments recognize the importance of Measuring teacher training and usage in regards to ICT.

However from a policymaking perspective, it is widely recognized that information needs differ amongst countries Depending on the level of ICT penetration in the education system.

It has therefore become imperative for teachers to be computer literate in the Nigerian Secondary schools. This can be done through in-service training and by the use of computer Service training for pre-service sciences teacher before they become in-services teachers. There are other consultancy services that can provide computer-training services to the pre-service sciences teachers. The educational institutions must have to provide microcomputers that will be able to serve the needs of their teachers If a great percentage of the teachers of secondary schools are computer literate, many of the problems they do encounter in computation of students results and preparation of lesson notes could be minimized. Suffice to say that the use of computers by teachers can reduce educational problems to the barest minimum. The computer can keep adequate records of teaching assignments. The unimaginable memory capacity of computer makes it possible to store information and be able to retrieve it within a twinkle of an eye. Regarding the difficulties in retyping the same document several times, once stored in the Computer, editing could be done faster and more accurately.

Ololube (2005) stated that the quality of teachers is known in virtually all countries to be a key predictor of student learning. Computer literacy among teachers will help them to take full Advantage of the potential of technology to enhance student learning as well as their professional Growth. In-service training, computer and information technology centre's in the colleges, consultancy service providers and inclusion of computer education with emphasis on practical work are some of the avenues for pre-services teachers in Nigeria can acquire computer knowledge and become computer literate and effective.

The unimaginable memory capacity of computer makes it possible to store Information and be able to retrieve it quickly. Regarding the difficulties in retyping the same document several times, once stored in the computer, editing could be done faster and more accurately. Most teachers with access to

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computer use them at least for writing lesson notes and written reports. A typical course in computer literacy includes the use of spread sheets for tabulating data and computing standard functions, as well as display of the results graphically. It also includes the use of database, and possibly how to define and build one (Kenny, 2004; Viera,2010).

Computer literacy and the use of ICT for teaching and learning

The use of ICT for learning is currently associated with computers and internet to facilitate teaching and learning (Mbah,2010). Using ICTs for teaching and learning includes the technologies used in conveying and storage of data, emailing browsing the internet looking for information (goggling), emailing, twittering. According to Mbah, (2010), educational technologies provide an array of powerful tools to transform the present teacher-centered and text-bound classrooms into rich, student-centered, interactive knowledge environments. It is important for higher education institutions and schools should embrace the new technologies and ICT tools for learning. Most of universities have started with compulsory computer literacy courses. Computer literacy has evolved.

The most common educational technology used at schools includes computer hardware, software, video-player and the internet. According to Iyamu and Adawu (2008) ,these forms of technology provide teachers and students with vast quantities of information in an easily accessible way that can be used as a teaching tool.

Nigerian's late entry into digital age is a blessing in disguise since it has a lot to learn from scholars, researchers and countries that have moved along that route before. Unwin (2005) argues that among other things, there should be a shift from an emphasis on 'education for ICT' to 'ICT for education'. Tubin (2006) explains that the ICT "lever" takes many forms and as such ICT's roles in the curriculum should be viewed as learning about ICT, learning with ICT, and learning through ICT. Loveless (2007) reveals that in the English National Curriculum in the UK, ICT is presented as a subject with particular knowledge, skills and concepts, and as a tool to support learning in other curriculum subjects. All these aspects are lacking in Nigerian Pre-services sciences teacher education curriculum. The researchers' experience with teacher education colleges reveals that very few lecturers are prepared to integrate ICT technologies into their own subjects. Many of them are of the view that ICT should be a separate subject taught by IT personnel. For them such integration is time wasting and of no importance. Of course there are several reasons for such a scenario as pointed out by Coutts, Drinkwater, and

Simpson (2001). They argue that teachers in schools see ICT use as an additional subject or complementary teaching activity because they lack the knowledge or skills that would allow them to integrate ICT into classroom learning, or begin to think about how ICT could be used to transform learning and teaching. This could be true of Nigeria since there is lack of an integration model or framework. The reasons that prevent educationists from using technology are many. Mumtaz (2000) quotes a number of researchers (Rosen & Weil, 1995; Winnans & Brown, 1992; Dupagne & Krendl, 1992; Hadley & Sheingold, 1993) who have come up with a list of inhibitors. Among others, the reasons advanced include lack of teaching experience with ICT; lack of on-site support for teachers using technology; lack of help supervising children when using computers; lack of ICT specialist teachers to teach students computer skills; lack of computer availability; and lack of time required to successfully integrate technology into the curriculum. Whilst these observations were made in relation to teachers in schools, they are applicable to lecturers in most Nigerian's teacher education colleges. McNair and Galanouli (2002)'s view that lack of or the absence of an agreed model for teaching through ICT, means that the potential for transfer of ineffective application of ICT as a pedagogical tool in teaching subjects is enormous. "Such situations are likely to result in the students themselves lacking the competence to use ICT in teaching in their placement schools." (Galanouli & McNair, 2000:192). At present there are no guidelines detailing how concepts, skills and methodology are to be used for teaching the students. ICT integration is being done in an uncoordinated way such that both the student teachers and the system will not benefit.

Most of the early ICT teacher training programs in the 1990 are focused on ICT use as the main training content. This approach has an emphasis on teacher training in how to use ICT in the classroom. It addresses issues such as selecting appropriate ICT tools and supporting students in the use of those tools, using ICT to promote learning activities, developing new methods of facilitating learning and evaluating student performance, and soon

ICT use as part of teaching methods

This approach integrates ICT into teacher training to facilitate some aspects of training. Two cases below show how a variety of ICT are adopted as part of effective training methods. In these cases, teachers are provided with examples of ICT-pedagogy integration in their training process. Captured Wisdom (<http://www.ncrel.org/cw/>) is a resource developed by the federally-funded (USA) North Central Technology in Education Consortium

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for K-12 teachers, school administrators and extended to adult literacy educators. It uses videotape and CD-ROM to help US teachers to see how technology can be integrated into their work. The Captured Wisdom (tm) CD-ROM Library is made up of stories about teachers who are making meaningful and creative uses of technology in their instruction. These CD-ROMs contain video descriptions and demonstrations of how technology is used in teachers' classrooms. They provide "examples of real educators and learners using successful practices of technology to support instruction and learning in their classrooms." Video sequences are viewed by teachers' focus groups who then discuss the strategies and techniques of classroom management, assessment, etc. In this specific case, teachers learn how to use ICT in their classrooms by actually being engaged in the process of ICT-integrated training. This writer of this paper is of the opinion that similar training can be repeated in our colleges of education in Nigeria where pre-service science educators are currently been trained. This will be further encouraging the pre-service science teacher to make use of ICT resources in teaching when they later become active in-service teacher. This will be of no doubt boast their performance in teaching of sciences and also foster better understanding of the students in what is being taught and in turn increase the productivity and academic performance of the science students

Another example of this approach can be found in the School Administrators' Technology Integration Resource (<http://www.satir-ritas.org>) project. It is a bilingual Canadian initiative which provides tools and resources to help school administrators successfully integrate ICT into curriculum in their school. It includes the National Center for Technology Planning clearinghouse of school district ICT plans, advice on how to provide Technology, successful practices in introducing ICT, perspectives on staff development, a beginners' guide to the Internet, etc. The focus of this project is not on the basic skill development but on the development of ICT pedagogy Integration skills of educators by sharing successful cases and practical ideas. UNICEF's Teachers Talking about learning (<http://www.unicef.org/teachers/>) also illustrates the application of this approach to ICT teacher training. It is designed for international collaboration between teachers in developing countries using the Internet and television. It provides access to teacher training materials and useful links and promotes discussions among teachers.

All the cases discussed above use ICT as part of training methods and promote teachers' ICT-pedagogy Integration in the classroom by demonstrating examples and allowing discussions among teachers throughout the whole training process. Participants of the training are asked to actually

use ICT to learn about ICT skills and develop ICT-integrated pedagogies. These training strategies seem to be supported by previous research that argues that teachers are likely to benefit by actively experiencing ICT skills as a learner (Jung, 2003).

ICT as core technology tool for delivering Science teachers training

In this approach, ICT is used as the major way of providing the learning experience of teacher training. The content of this approach does not necessarily focus on ICT skill itself but rather covers a variety of ICT applications. As you will see in the two examples below, the digital technology is frequently becoming the core technology of ICT teacher training.

The case of the Virtual High School (VHS: <http://www.govhs.org/website.nsf>) in the USA provides an example of the Internet-based ICT teacher training. VHS is a non-profit organization that facilitates a collaborative of participating secondary schools; for every semester a participating school offers a VHS Net Course that school can enroll up to 20 students in VHS courses. A limited number of student-only schools are allowed to enroll students (10 per semester) on a trial basis, for a single year, after which they must train a teacher and join VHS as a fully participating school. The VHS has developed two graduate-level online professional developments courses for teachers of participating high schools: a 26-week Teachers Learning Conference (TLC) course which trains teachers to develop and teach a Net Course for VHS and a 15-week Net course Instructional Methodologies(NIM) which trains teachers to teach an existing online VHS course.

The Teachers Learning Conference (TLC) is designed to train teachers to become online course instructors and course developers whereas the Net course Instructional Methodologies (NIM) is designed to prepare classroom teachers to become online course instructors only. The TLC provides instruction on the pedagogy and methodology that each teacher will need to develop an effective Net Course to be offered to the VHS students. A facilitator, a veteran VHS teacher, is assigned to each TLC participant to ensure that they have the correct resources to achieve training objectives. The focus the NIM is on content and curriculum, as well as good online course delivery. Experienced facilitators are assigned to help NIM participants access the correct resources and monitor each participant's progress. Both of the teacher training courses at VHS use the Internet as the main delivery technology and focus on ICT pedagogy integration in an online learning

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environment. Support given by facilitators of these courses is known as an important factor which helps teachers have positive experiences with technology and integrate technology into their own teaching (Freeman, 1997).

Therefore the author of the paper find the above pedagogy so interesting that it could also be integrated into our science teacher training colleges at their pre-service stages before they graduated to become teachers. Although VHS uses in-service teacher as their own case study , the researcher here deem it fit that it will be ok if pre-service science teacher are trained and certified prior to their integration into the teaching profession which will make virtual all of them ICT compliance before they started teaching as a profession. The knowledge gain at their pre-service level will be of greater use to them in teaching of science since it must have become part and pursue of their ways of learning and teaching

ICT used to facilitate Professional Teachers Development (TPD)

The use of ICT as core technology for delivering teacher training can be found in limited contexts, there are many examples of ICT, particularly Internet and Web-based communication technologies, being used to support teachers' on-going professional development. Some countries have developed a website or websites to provide online resources for teachers and facilitate teachers' networking based on the assumption that professional development should be an integral part of daily practice for all teachers and the use of the Internet would enhance continuous professional development activities of teachers, connecting teachers to larger teaching communities and allowing for interaction with expert groups. Specific examples are discussed below.

The UK Virtual Teacher Centre (<http://vtc.ngfl.gov.uk>) website provides a "Career Development" area which provides a variety of learning and teaching resources and links to support teachers' continuing professional development. Under "Support Providers", for example, teachers can find a range of resources for professional development, such as the ICT Support Network Directory which provides easy access to ICT provision and training. Teachers also find a link to the New Opportunities Fund (NOF), which is currently providing ICT training for teachers and librarians. "International Professional Development" helps teachers learn from and contribute to educational ideas and best practice throughout the world. Teacher Net UK (<http://www.teachernetuk.org.uk>), an independent professional association for teachers, also supports teachers' professional development and national and international teacher networking. The Korea's EduNet (<http://www.edunet4u.net/>) is an integrated educational internet services for

K-12 students and teachers managed by the Korea Education and Research Information Services. Through the EduNet, teachers can search the materials according to training institution, content, instructor, year of publication and type of training, and download them for self-training. These online materials can be also used for individual study in conjunction with face-to-face courses, or as learning resources for online teacher training courses offered by educational institutions.

At the international level, the World Bank's World Links for Development (WORLD) (<http://www.worldbank.org/worldlinks/english/index.html>) program provides Internet connectivity and training for teachers, teacher trainers and students in developing countries in the use of ICT and other technologies in education. The World then links students and teachers in secondary schools in developing countries with schools in industrialized countries for collaborative learning via the Internet.

Other examples include: School Net SA (<http://www.school.za>), a South African organization providing supports to educators and learners who wish to use ICT in education; Singapore's Clearinghouse (<http://www1.moe.edu.sg/iteducation/resources/welcome.htm>), a website created by Ministry of Education to provide ICT resources and internet educational resources including lesson plans for various content areas for teachers; Swedish School net (<http://www.skolutveckling.se/skolnet/english/index.html>), a website to stimulate the use of ICT in schools; and European School net (<http://www.eun.org/eun.org2/eun/en/index.html>), the European framework for the co-operation between the European Ministries of Education on ICT use in education.

Discussion, Recommendations and Conclusions

Overall, governments and teacher training colleges seem to recognize the importance of integrating ICT in education and science teacher training. In many cases, the national vision for ICT use in education has been integrated into teacher training. For example, Singapore's teacher training institute has successfully integrated the national vision toward ICT use in education into its ICT plan. Other countries such as UK, USA, South Africa, Sweden and Korea have developed extensive online resources and encouraged active exchanges of new pedagogical ideas to upgrade teachers' knowledge and skills at the national or international level.

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In addition, the author believe that Nigerian teachers training colleges of education can also integrate such approaches discussed above into their science teacher training processes while they are still undergoing training. It will be welcomed developments if Nigerian teacher are made to pass through ICT Compulsory courses before they become in-service science teachers

Effective training and usage of ICT in teaching is important since poor or improper usage and management of ICT in the classroom may result in underperformance in educational outcomes. The inefficient use of ICT-assisted instruction wastes time that could have been used for learning content and developing skills (UNESCO-UIS, 2014a). Effective usage requires quality teacher training; thus, it is important to identify clear indicators that shed light on how teachers are trained as well as how they use ICT in education.

It is also observed in the analysis that a variety of ICT-integrated training environments have been created to provide more effective ICT training. As indicated above, teachers tend to integrate ICT in their teaching if they experience ICT skills as a learner (Collis & Jung, 2003). This is the same point that the author of this paper is trying to elaborate and preached to Nigerian educational policy makers to incorporate into our science teachers training colleges. Teacher training approaches in this paper show that many cases adopt ICT into their training process not just as content of the training but rather as an integrated training environment and thus allow teachers to experience ICT-based pedagogies. The cases of VHS and Captured Wisdom are those examples. One UK site has compiled cases of technology-integrated pedagogical strategies for teachers (<http://www.educ.cam.ac.uk/tips/reports.html>) and made suggestions in incorporating ICT into the curricula. More hands-on experiences that relate ICT to the achievement of wider pedagogical objectives are suggested at the initial training level and at the advanced level, the provision of opportunities for teachers to produce and disseminate ICT-based instructional materials is recommended.

This paper suggests that indicators measuring teacher training need to capture a wider range of professional development training approaches, With the advanced use of ICT in the classroom it is necessary to go beyond the mere presence of ICT in the classroom, but also develop indicators to measure science teachers' specific usage patterns, pre service science teacher training as well as linking the added value of ICT usage patterns to student outcomes.

A well-designed teacher training program is essential to meet the demand of today's sciences teachers who want to learn how to use ICT effectively for their teaching.

We also need more empirical studies focusing on factors affecting ICT learning process in our pre-service teacher training colleges, satisfaction and achievement in different pre-services science teacher training approaches. Given the fast development of ICT, we can expect that ICT will bring changes in forms of teacher training throughout the world. It is thus important for sciences teacher trainers and policymakers to understand the factors affecting effectiveness and cost-effectiveness of different approaches to ICT use in science teacher training so training strategies can be appropriately explored to make such changes viable to all.

ICT changes rapidly and affects both discipline knowledge and pedagogical possibilities in ways that influence teachers' perspectives for employing ICT as a constant part of the learning process (Twining et al., 2013). Teacher indicators that capture these evolving needs are also important to identify and develop.

It is hoped that by expanding ICT in sciences education indicators on teachers that a more comprehensive view of the role of the teacher in influencing pupil outcomes, including achievement and school completion can be achieved. Furthermore, meaningful discussion must continue amongst stakeholders and consensus should be achieved in order to priorities pre – Service science teachers ICT training and certification prior to the completion of their teacher training courses.

Finally, national and international partnerships across public and private sectors need to be formed to share resources, knowledge, and experiences in providing effective and efficient ICT pre-service science teacher training in colleges of educations. ICT teacher training efforts made by organizations have shown training advantages of international collaborations and benefits of using ICT for science teacher training and learning process.

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