7 21st Century Learning Technologies Use In Nigerian Classrooms: Issues, Prospects And Challenges

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Abstract

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Introduction

The 21st-century world is in a state of flux, change is not only imminent but also so fast that there is a need to stay alert if one must keep pace with development in the world of technology. These changes have affected the schools and the conceptualization of education, teaching, and learning. According to Prensky (2001) in Wylie (2016), "Our students have changed radically. Today's students are no longer the people our educational system was designed to teach". Apart from the incongruence of the school system with the present students whom Prensky (2001) rightly described as digital natives, teaching them has become very challenging to teachers who themselves are digital immigrants. The teachers do not believe that the present generation of learners can learn from digital technologies because they did not learn by

that means. It will be a misnomer to expect the 21st Century students to operate effectively in their millennium wearing the thinking caps of the old generation. It becomes absolutely important that teachers keep pace with modern learning technologies available so as to help the students find, select and access necessary information and knowledge using technological/ digital tools.

Digital/ Technological Literacy

Literacy is an integrated construct consisting of multiple practices, skills, and attitudes which are needed for performing and conceptualizing in various contexts (Brown, Hamilton & Ivanie, 2000 in Moemeke, 2011). Though Mackenzie (2009) did not include digital literacy in his categorization of literacy, his definition of literacy as "the capacity to analyze, interpret and understand information within a particular category of information or within a particular medium with each category requiring specific tools, concepts, and vocabulary to unlock the full meaning of information" is instructive. It means that for every domain and time, there are information needs and there are tools and skills necessary for proper understanding and utilization of the information.

In this digital time, which has been referred to as the information age and the age of technology, information abounds. However, only individuals who possess the right skills and knowledge about the tools to unlock the information that can access, analyze, interpret, and utilize it. Digital information thus requires digital literacy for access and use. A digitally literate person will possess a range of digital skills, knowledge of the basic principles of computing devices, skills in using computer networks, abilities to engage in online communities and social networks while adhering to behavioural protocols, be able to find, capture and evaluate information, understanding of the societal issues raised by digital technologies (such as big data), and possess critical thinking skills (Wiki, 2015). Digital/ technological literacy is thus much more than just using computers or possessing

computing skills. It is about digital competence. The European Commission produced the framework for digital competence and listed problem-solving in a digital environment as an indicator of digital competence. Other definitions of digital literacy available in the literature include:

1. The ability to use digital technology, communication tools or networks to locate, evaluate, use, and create information (Digital strategy glossary of key terms in www. Digitalstrategy. govt.nz/mediacentre/glossary-of-key-terms).
2. The ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers (Gilster, 1997).
3. A person's ability to perform tasks effectively in a digital environment... Literacy includes the ability to read and interpret media, to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from the digital environment (Jones-Kavalier & Flannigan, nd).

21st Century Learning Technologies Framework

The partnership for the 21st Century learning (P21) has put forward a framework to describe the student learning outcomes and support systems necessary for the effective utilization of technology in learning in the 21st century. While the learning outcomes describe and enumerate the skills and knowledge which students require to develop in order to work and survive effectively in the 21st century, the support systems also show the conditions under which such outcomes are to be fostered, enhanced, and acquired. Learning in the 21st century is not about teachers using a few pieces of gadgets to teach but about learners having the opportunity to access, create, contribute, and

communicate effectively within the learning system. It is an intricately woven interconnection between the outcomes emphasized and the system that can enhance the perfect application of the technology as illustrated in the diagram below.

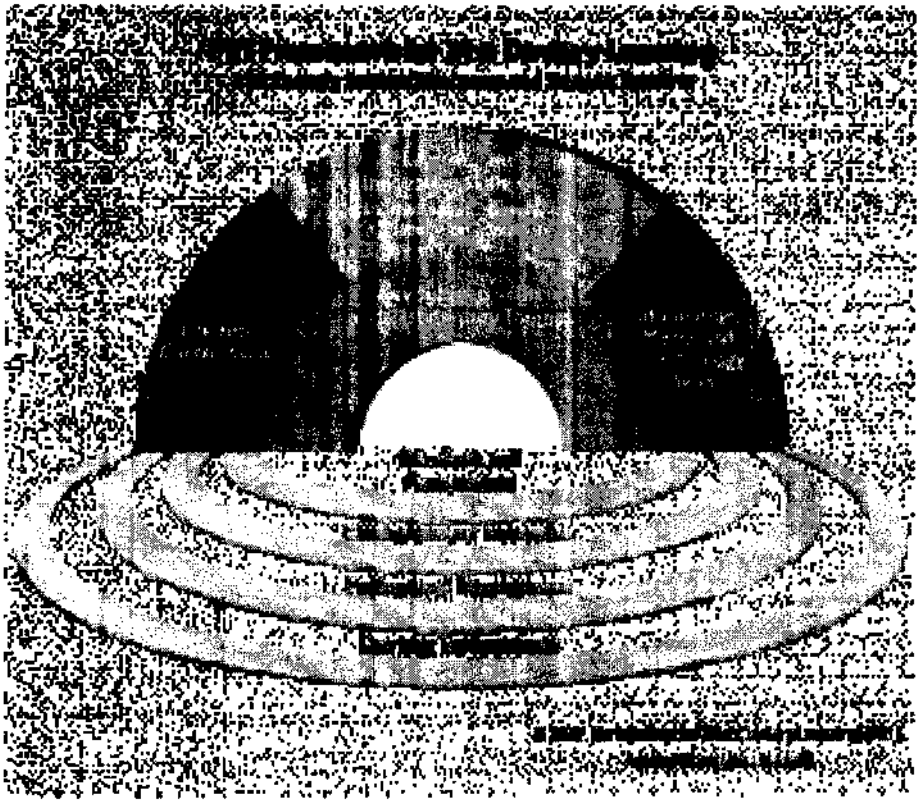

Fig 1. Framework for 21st Century student learning outcome and support systems by P21 partnership for 21st C learning, (from www.p21.org/framework)

The student learning outcomes according to the P21 framework fall into four broad categories

- Content knowledge and 21st-century themes in which students are expected to master disciplinary subject areas woven with 21st Century interdisciplinary themes like global awareness, financial, economic, business,

  scientific and entrepreneurial literacy, civic literacy, health literacy, and environmental literacy.
- Learning and innovation skills which are the 21st century

based and consist of skills in the 4Cs (Critical thinking, Communication, Collaboration, and Creativity).

- Information, media, and technology skills with the ability to access large information, use and adapt to rapid changes in technological tools, and ability to collaborate and make contributions through the use of media and technology.
- Life and career skills such as flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility.

The critical system supports necessary for learners to acquire the outcomes are listed below.

- 21st-century standards
- Assessment of 21st century skills
- 21st-century curriculum and instruction
- 21st-century professional development
- 21st-century learning environments.

A theoretical model that explains the elements essential to the utilization of 21st-century learning technologies is the Technology, pedagogic content knowledge, (TPCK) put forward by Continho and Junior (2009). The framework or model considers that complete and advantageous integration of technologies in the teachers' practices depends on the balance that the teacher is able to establish between the scientific knowledge and the domain of contents which is the teacher's specific area of training; the pedagogic knowledge at the level of competence anchored in learning theories and in technique and the technological knowledge processes. This integration is illustrated in fig 2 below.

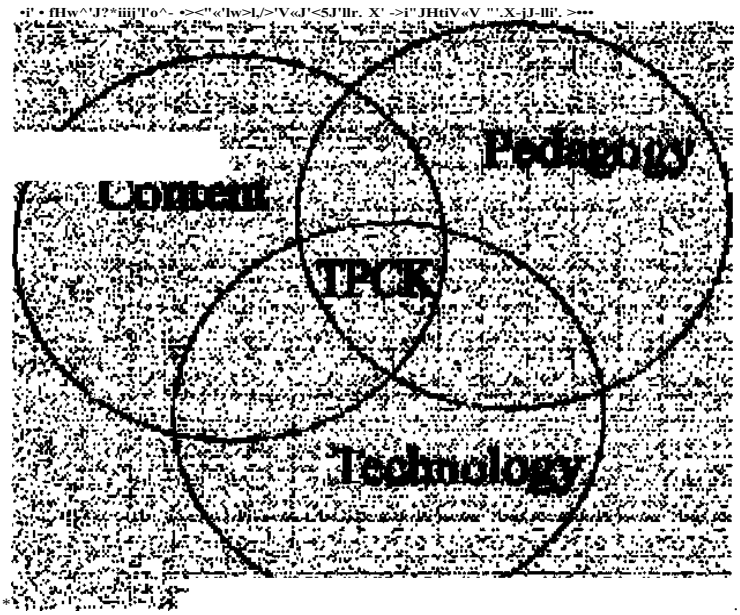

Fig 2: from Continho & Junior (2009: 255)

Teachers' ability to utilize technology in a 21st century learning system requires an integrated knowledge of pedagogical content knowledge, technological content knowledge and technological pedagogical knowledge. What today's students need are educators to re-envision the role and use of technology in the classroom. 21st Learning Technologies for the Classroom The evolution of mobile technology has put learning in the palm of both teachers and their learners. Mobile technology refers to mobile devices that include Personal Digital Assistance (PDA), tablets, digital cell phones, and iPods. They are self-effacing enough that they have become useful in implementing different learning techniques and pedagogies (Dale & Povey, 2007; Varis, 2007; Arkorful, Oduro & Abaidoo, 2016). Mobile technology learning, otherwise called M-learning is learning achieved through wireless technology devices that can be pocketed and utilized wherever the learner's device can receive unbroken transmission signals (Attewell & Savil-Smith 2005). Though Traxler (2010) in Laxman (2012) cautioned against the adverse effect of a parasitic relationship between education and technology in which devices originally intended for the corporate environment are forcibly transplanted into education on the basis of their instructional efficacy, it will be improper

and foolhardy to ignore the impact of mobile devices on learning (Melhuish & Falloon, 2010; Dias & Victor, 2017). Mobile technologies have helped to reconceptualize what actually constitutes the classroom or learning space by engendering a dimension of learning that is free from the constraints of a fixed time, space, and place. The use of technology in education has provided students and teachers with an unlimited number of options for classroom learning.

Apart from its innovativeness, its portability and ease of use have made it more versatile than desktops and laptop computers. It has become a technological tool of choice in the classroom. Teachers could help students re-focus the use of their mobile phones for more rewarding functional use. The popularity of these devices with the students warns the teachers that if they are not exploited for teaching and learning, they will become sources of distraction to students and to their ability to learn in the classroom. Keeping pace with this technology for classroom use is not only important to teachers and educators but also absolutely unavoidable. Students and teachers can use mobile technologies anywhere the classroom is located such as in the school field, the garden, on the school farm, in the gym, during field trips, etc. They do not need to wait to get to the computer laboratory to do an assignment, answer a question, or access important information. Some mobile technologies that are revolutionizing classrooms and learning in this century include but are not limited to:

1. The iPod Touch: It has a tactile touch screen and easy-to-use applications. It has in-build Wi-Fi to internet access and the ability to tap into thousands of apps available at the iTunes store such as

- Dictionary and these viruses at Dictionary, com
- Google Earth to explore the world
- Quick Graph to plot equations
- download the kindle app which turns the iPod to an e-

reader

- Create stories with story kit
- NASA app to explore space missions etc.

Studies to ascertain the academic potentials and benefits of mobile applications have shown that apart from its benefits as a learning tool, learners' vocabulary improved, their understanding of content/concepts improved, students/learners were more motivated to do well and prepared for class than their counterparts who did not use them (Wylie, 2016). The use of proloquozgo, an assistive technology app available on iTunes has also been found to help autistic students and those with speech disorders to convert text-to-speech and symbols and enhance their communicative ability. It is an augmentative and alternative communication (AAC) app for iOs devices.

1. E-Readers: These are portable easy- to- update and cost-effective devices that can hold a lot of books and the content of which can be read on netbooks, e-readers, laptops, etc. Students and teachers can therefore carry all their books wherever they go but in a small electronic device. Apple's iPad offers users an e-reader as well as wireless internet function, office applications, educational apps such as an interactive periodic table, Alphabet fun which teaches handwriting, number and letter recognition, and the "Beautiful planet HD" which enables learners to have a photographic tour of 160 different countries (Wylie, 2016). With the use of cell phones (mobile) technologies students can assess various web sites, blogs, connect to digital libraries, digital *I* classrooms away from their own, collaborate with groups and individuals as well as communicate

through social media.

2. Use of Open Education Resource (OER) Facilities such as moodles (Modular Object-Oriented Dynamic Learning Environment) which is a free software e-learning platform is also known as a learning management system or virtual learning environment (VLB). Also useful are extranormal which empower teachers and students in new ways of expressing themselves in the classroom. Xtranormals are digital ways of producing animation from speech.

3. Technologies such as laptops, desktops, compact disks, videos, Televisions, projectors, etc have proved effective on students learning.

It is no more sufficient for teachers to use a particular technology or software but students need constant assess to an evolving array of technological tools and activities that will enable them to engage in problem-solving, decision-making, teamwork/ collaboration and innovation.

1. Audio and video devices such as radios, television programmes, DVDs, and VCD have been in use in the classroom for a long time. Technologies of the 21st century now allow teachers to stream audio over the internet. There are also webcasts and podcasts available over the internet for students and teachers to download. Websites like Youtube also allow teachers and students opportunity to watch online videos. Messaging programs such as Skype, Adobe Connect or webcams are used by teachers to interact with guest speakers and other experts.

2. Blogging: these are personal internet journals that allow both students and teachers to post their thoughts, ideas, and comments on the website for others to comment on, open discussion or seek opinions. Blogging allows students and teachers to share their thoughts and comments on the thoughts of others thus creating an interactive learning environment (Courts and Tucker, 2012) online even when separated by distance. 3. Webcam which are video cameras that stream images through the computer network and could be webcasted to create virtual platforms, In this environment, teachers can give instructions and receive feedback from students.

4. Screen casting: This is a recent trend that allows users to share their screens directly from their browser online so that the viewers can stream the video directly. By this means a user can follow the individual's line of thought without ambiguities associated with explanations.
5. Artificial intelligence (AI): This involves the use of computer to produce simulations of intelligent behaviours in robots to perform tasks usually performed by intelligent humans.

Learning Technological use in Nigeria: What Hindrance?

The peculiar situation of Nigeria today makes adopting innovations difficult. Even with the awareness of the revolutionary effects of technologies in today's world, integrating these technologies into the classroom for learning purposes by students is hindered by such factors as

1.

1.1 Institutional Factors: Institutional factors play key role in determining teachers' acceptance and use of learning technologies

in their classrooms (Arkorful, Odour & Abaidoo, 2016). Certain institutional factors such as inadequate attention to technical problems that arise while using technologies (Jones, 2004), the institution's objectives and vision, and the provision of system support for learning technology users are major hindrances to teachers' and students' acceptance and use of technology in learning.

- Inadequate amount of training for teachers in the use of 21st-century learning technologies. Mueller et al (2008) have expressed the view that for successful integration of technology into the classrooms, teachers need to be properly trained in designing modern lessons suitable for learning through technology, use of learning technology devices, modern communication, and accessing, disseminating knowledge via modern technologies and educational benefits of modern technologies. Most Nigerian teachers were not trained with technology. Evidence from studies has revealed ambivalence and unwillingness to accept and use technology by teachers. Most teachers lack the necessary skills to innovate in teaching, to build and use blogs, to access the internet, to use Google sites, wiki sites, and high-tech devices such as mobile phones. Poor digital literacy skills due to poor teacher preparation techniques are responsible for teacher ineffectiveness in the application of modern technologies in Nigerian classrooms.

1.

1.1 Availability of constant energy supply to power technological devices for learning. Irregular power supply

has frustrated users of technology from integrating it into the learning system.

1.2 High cost of High Technology devices such as advanced computers, ipads, iPods, etc, and other mobile devices with the necessary applications and web 2.0 tools for learning. Most of these devices are out of the reach of learners and their teachers. Most schools have no internet connectivity for students to use freely.

1.3 Fluctuating Transmission signals make the use of Internet-based technology frustrating to both teachers and learners.

- Perception about What Constitutes Learning: Learning in the 21st century is not merely internalizing and memorizing texts but consists of the 4Cs – critical thinking, communication, collaboration, and creativity. These constructs are quite flexible, multi-dimensional and adaptable to technology use. Viewing learning in the didactic form constitutes an impediment to 21st-century learning through devices.

  Curriculum structure: The present structure of the curriculum gives little or no room for innovativeness and creativity on the part of teachers and students. The curriculum is not only time-framed but also highly sequenced and teacher-centred. The curriculum of the 21st - century should give room to multi-dimensional learning from diverse activities and devices to meet students' needs.

- Along with the highly sequenced and rigid curriculum, school timing and timetable and fixed place/ space concept of learning environment

are the rigid assessment practices. Continuous reliance on paper and pencil tests as means of assessing learning outcomes (cognitive) neglects digital literacy and the learning that emanates from it and denies the educational system the opportunity to avail itself of the rich resource provided by modern learning technologies. Until the Nigerian educational system departs from age-long assessment stereotypes, keying into learning technologies-use for classroom purposes will remain a mirage.

Conclusion

The world today is powered by technology. The education of any nation is to empower the citizens to fit successfully into their society. The 21st-century world is ruled by information. Only individuals with the ability and skills to utilize modern digital tools to access and generate information and knowledge can perform in the global workspace and platform. The technologies of today have completely changed the platform for learning. Students now learn from different sources. Teachers need to key into the modern learning modes by utilizing the tools offered by the digital revolution to prepare learners who are globally empowered. The idea of a fixed classroom where students learn only in the presence of their teachers and from what the teacher provides for them has gone. Learners can now learn with the teacher directing even when they are separated by time and distance. This type of learning, apart from its efficacy in promoting self-paced learning, motivates learners to engage in research and dissemination of knowledge which are connected to networking and collaboration. To remain relevant therefore, teachers and students should keep pace with the learning technologies of the time through re-engineering and innovating in system structure, perceptual change, instructional, administrative and assessment practices that are compliant with the 21st Century literacy skills.

Recommendations and Future Direction

Nigeria's large population posits her as one of the world's highest importers and consumers of technologies. Most of her youths are very active participants in web-based discussions and social media. Their high level of interest can be tapped for educational purposes. Prior to this decade, possessing a cell phone by a student within the school environment and worst still in the classroom was considered one of the worst offenses a student can commit against the school authorities and teachers. Such devices were often confiscated from the student. This previously perceived distracter holds great potential for improving learning in the 21st-century context. Schools should therefore begin to rethink the role of mobile technologies in learning and divert their use to positive ventures. Schools should provide learning technologies for both teachers and students. Where the financial implication is too huge for the schools, a leaf should be borrowed from New Zealand's programme of Bring Your Own Device (BYOD) experimented in Orewa College, Auckland (Laxman, 2012). Mobile devices should be included in the list of what learners require to learn just as conventional books.

Intensive training of in-service and pre-service teachers on the use of modern technologies in teaching has become quite necessary. The world is moving at a fast rate. The present curriculum for educational technology for teachers requires not only a review but a complete overhaul to include the practical use of technologies for now and for the future. The present efforts of allowing teachers to attend a one-week computer training are far from being adequate in modern classrooms. Suffice it to say that computer literacy is a lot different from digital literacy though subsumed by it but essential as a precursor to it mastery. The present-day digitally wise learners are often bored and unmotivated in the classrooms of digitally illiterate teachers. Knowledge and skills required by teachers which should form the crux of their digital training should include searching the web using a variety of search engines, accessing sites, making posts, blogging, uploading, downloading, sharing information, websites for different subjects, activities, and events, planning

web complaint lessons, handling learners' responses and assessing on -line assignments, texts, activities, setting up virtual classrooms etc.

There should be active innovations in the curriculum of Nigerian schools at all levels. This innovation should explore alternative teaching models other than the fixed classroom. Teachers should spend more time planning and designing lesson activities. Learners on the other hand should take charge of their learning by engaging in diverse learning activities, searching for information, communicating with other classrooms on - line apart from theirs, and collaborating in research in their areas. This is the crux of innovative teaching and authentic learning.

In addition to improving the technological facilities in schools and upgrading to more modern versions, efforts should be made by the Nigerian government, the Nigerian Communications Commission (NCC), and the telecommunications network providers to improve the transmission signals (Network signals and services) available to Nigerians at all times. A nation without digital connectivity is a nation in the dark. The cost of connecting educational institutions and students to networks could also be subsidized. The need to improve the power supply is here re-echoed.

Finally, schools, institutions, and administrators need to change their mindset regarding what constitutes good teaching and learning and embrace modern ways of making students learn. The archaic way of judging teachers' competence, assiduousness, and efficiency with the length of notes copied on the board for students to memorize is gone. Whatever learners acquire by rote is unequivocally unproductive and of no use in this modern age.

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