
E-LEARNING INFRASTRUCTURE AND THE TASK OF ONBOARDING THE NIGERIA TEACHER ON COMPUTER AND CLOUD-BASED LEARNING

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ABSTRACT

Technology in education is evolving fast, and as a result, schools are not left out in upgrading their technology infrastructure to keep up with the challenges of modern methods of virtual teaching and learning. Schools and colleges provide learning infrastructure to keep abreast of best global educational needs and practices. Computer and cloud-based software, including; communication and research capabilities are expected to be shared and streamlined among students and teachers. Similarly, Students and teachers with smart phones now have access to high-speed internet, to participate in online discussions and share their work on websites. Ironically, teaching practice, training and recruitment in Nigeria are still stuck with the colonial curriculum process of teaching and learning. Consequently, Nigerian teachers are estranged in the virtual world of cooperation and collaboration which the interface of computer and cloud-based teaching and learning provides. Short term and continuous capacity building programmes on digital skills for teachers are hereby canvassed to onboard practicing teachers in the world of educational technology for optimal utilization of the modern teaching and learning infrastructure now available in modern schools.

Key Words: e-learning infrastructure, onboarding, computer based learning and cloud based learning.

INTRODUCTION

The World Wide Web and advances in Open Source Software have led to e-Learning Revolution, where students can access a plethora of learning content and materials easily and at convenience. Educational institutions at all levels and forms have joined the foray of creating the necessary e-learning infrastructures to aid teaching and learning. E-learning aided instruction as school information portals, Information Communication Technology (ICT) units and digital libraries are being provided by schools to be mainstreamed in education technology. Umrani and Iyer (2009) identified four determinants of e-learning acceptance as; performance expectancy, effort expectancy, social influence and facilitating conditions.

To address the above determinants for e-learning acceptance among teachers by Umrani and Iyer is to onboard teachers into the skills and competencies to use technology as a flagship to drive the educational system. The curriculum programme of teacher training and recruitment has to tilt towards teacher competencies on digital learning. Training and retraining of the teachers, both on recruitment and on- the-service are essential to keep abreast of the virtual paradigm shift in teaching and learning. Teacher skills and competencies on e-learning application would promote confidence, self-esteem, creativity and innovation capacities in teacher service delivery in and outside classroom.

The skills in computer and cloud-based teaching and learning for teachers according to Grimes, (2000) embody the following:

- Initial training which familiarizes the teacher in cognition and basic handling of technological devices that aid classrooms instruction, exploring the tools of digital educational materials.
- On-going training or capacity building to provide teachers with a variety of training proposals that lead to reflective teaching and .
- Using Information and Communication Technology (ICT) for delivery of lessons and other academic programmes in and outside the classroom especially with respect to subjects' discipline.

Unfortunately, teaching practice, training and recruitment in the Nigeria education is greatly stuck to the colonial 20th century curriculum of face- to –face classroom teaching and learning process on chalkboard. Consequently, the average Nigerian teacher is estranged in the virtual world of cooperation and collaboration with the interface of computer and cloud-based teaching and learning. The paper therefore, advocates full integration of training and capacity building of teacher skills for application of edu-technology pedagogy in all fields of education in Nigeria.

Concept of E-learning Infrastructure

The objective of instructional media is to aid teaching and learning. Learning infrastructures according to Kharback (2023) are the facilities, instructional materials; both physical and learning software that aid teaching and learning. Hedge and Hayward (2004) defined e-learning as innovative approach to delivering electronically mediated, well designed, learner centered and interactive learning environment to any one, any, place and any, time by utilizing the internet and digital technologies with instructional design principles. The term e-learning infrastructure therefore, could be described as all the digital applications and services that facilitate real time teaching and learning. They are electronic systems and frameworks employed as interface for teaching and learning. The systems and networks for learning activities inter-alia are the Learning Management Systems (LMS), electronic devices, communication applications and internet accessibility facilities (Siavash, Maslin, &

Selamat, (2011). There are as well virtual libraries, e-textbooks, e-workbooks, educational videos-among others. The physical components of e-learning technology resources such as the computer hardware, scanner, printer, internet e-mail, teleconferencing devices, wireless applications protocols (WAP), radio and microwaves have become common sites in Nigeria educational institutions.

For the purpose of this study, E-learning infrastructure and approaches is classified into computer based learning (CBL) and cloud based learning (CBL). The CBL is computer aided instruction, teaching and learning. The process of e-learning is cloud-based when the teaching learning experiences are domiciled in the digital space. The process of cloud learning does not require installation of any software to the computer for learners to access teaching and learning content but the internet and data connection.

Computer Based Learning

Computers are electronic devices meant for storing and processing of data in line with instructions given to it in a variable programme. Cotton (2002) observed that computer-based or computer aided learning involves the use of the interactive elements of the computer for educational services delivery (synchronously or asynchronously). Computer based instruction is an interactive instructional technique of using the computer to access, present and monitor teaching and learning. The process may include the use of a combination of text graphics, sound and video for effective learning process.

What is Cloud-Based Learning?

The word cloud computing is a term for delivering hosted services in the internet. Cloud based educational services may be Infrastructure as a service (IaaS), Platform as a service (PaaS) or Software as a service (SaaS), Anything/ Everything as a service (XaaS) or Function as a Service (FaaS) (Pandey, 2023). Cloud-based e-learning experiences take place virtually in a digital space. The process involves storing of learning content software online to bypass the confine of a particular computer. What is needed to access the cloud teaching and learning content is internet connection anywhere anytime.

Launching cloud-based e-learning programme involves use of authoring tools to create learning content online. Pappas (2012) noted that the software used in creating cloud-based content can be stored in the authoring tool or cloud-based Learning Management System (LMS). Cloud-based learning makes educational content accessible at any location with any computer device thereby strengthening the quest to develop interface to reduce teacher continuous intervention at every stage of teaching and learning.

Nigeria Educational System and E-Learning Infrastructure

Nigeria is the most populous country in Africa with a projected population of 221,364,133 as of June 27, 2023 based on Worldometers elaboration of the latest United Nations. The country is a federating unit of 36 states and 774 local government areas. Education is in the concurrent list of the country's constitution which allows all the tiers of government and the private sector to establish and run schools. However, the statutory mandate of making overriding educational policy is vested with the Federal Ministry of Education (FME) (Ogedegbe and Oyaniyi, 2010). The Ministry of Education formulates educational policies, co-ordinate and supervise educational activities through several subordinate and affiliate ministries, agencies and commissions.

State governments and individuals establish schools in line with policy provisions of the Federal Ministry of Education (FME). The local governments, state and federal governments

jointly fund public primary schools. As a result of the structure of the educational system, the responsibility of infrastructural development of Nigeria schools rest on the providers of such schools.

Nevertheless, the overriding educational policies of the Federal Government through the Federal Ministry of education always set the tone of educational development in the country. One of such policies is the introduction of computer education in all levels of the educational system and subsequent policy directives to back them up. In 1988 for instance, the Federal Government introduced the National Policy on Computer Education (NPCE) which directed for the teaching of basic computer skills including rudimentary use of computer for text writing, computation and data entry to facilitate computer learning (FRN, 2019). The policy was later supported by the US \$100 XO laptop computer project for Nigeria's 24 million public primary schools which was received by the Federal Government and distributed to public schools.

In 2001, the Federal Government introduced the National Policy on Information Technology (NPIT) and subsequently the Information Communication and Technologies (ICT) policy on education introduced in 2010 which was adopted by the Federal Government in 2019. The above policies have witnessed massive deployment of e-learning infrastructure to schools, colleges and higher institutions to integrate e-learning as a veritable tool for modern education in line with global educational practices. Government resolve to integrate ICT in teaching and learning was further demonstrated in the National Policy on Education which noted that Government shall provide facilities and necessary infrastructure for the promotion of Information and Communication Technology (ICT) at all levels of education (NPE, 2014; Revised). The nation's policy thrust for ICT in education was further reinforced with the advent of the COVID-19 pandemic. E-learning as alternative pathways for teaching and learning was embraced by schools at all levels with the e-learning infrastructure available in most schools for schools to come on stream after a long period of interruption of academic calendar.

Computer and cloud based learning has as well been embraced in schools for apart being an alternative learning pathway to teaching and learning, the approach is also a response to the global trend of cooperative and collaborative education. It has provided paradigm shift from the traditional face-to-face chalk board model of teaching and learning. Computer and cloud based learning approaches are more cost effective way of providing education to all learners notwithstanding the socio-economic and geographical location of learners. E-learning or digital learning has taken away the school age youths from the textbooks to the e-books and from the socialization agents of social groups to the internet socio media. This development was captured by Blinco, Mason and Wilson when they noted that

Increasing proportion of learners are digital natives whose socialization and engagement with ICT differs radically from that of previous generations, Google queries; adhoc- surfing of web, numerous messaging and interaction technologies (e-mail, web forums and real time chat); personal weblogs, collaborative websites such as wikis, research tools that enable the classification and clustering of queried results on the fly; purchase of goods and services, sophisticated virtual reality and simulation environment, gaming and role play applications are not only daily experience and key methods of interaction for digital native but they are both the normal expectation and historical experience (Kerry, Mason & Scot; 2004, p1) .

The generational shift to the internet encourages the Government advocacy for integration of ICT in the educational system with the adoption of the Dutch (MICTIVO) model of ICT centered on Infrastructure, Policy, Competencies, Use at Micro level and Perception of Teachers on the use of ICT at lower levels of education. Furthermore, government and institutional efforts at e-learning infrastructure inschools are being supported by international development agencies, non-governmental organizations, banks and individuals especially some communication companies. For instance the MTN, a telecommunication company has constructed digital libraries in several schools and institutions of higher learning in the country. Similar gestures come from many indigenous companies as ZINOX computers, known for donating computers to schools and higher institutions. The donations according to Cutis, Luchini, Bobowsky, Quitana & Soloway; 2002 are in addition to significant development number of handheld electronic android devices with students especially in higher schools which are flexible tools suited for the needs of a variety of teaching and learning styles.

The challenge is the extent of preparedness of the Nigeria teacher in deploying the e-learning resources for effective teaching and learning. The reality is that in motivation, technological confidence, skill and interest. Most Nigeria teachers are not equipped to take up this responsibility. In training, the teacher curriculum has little to offer either to the student teacher or the practicing teachers. Institutional arrangements for computer and e-learning skills for the serving teacher are attached to promotion through certification and not for classroom application. Such application is nonexistent in teaching practice and practicing teachers graduate estranged in the world of internet and cloud based teaching and learning.

Onboarding the Nigeria Teacher in Computer and Cloud-Based Learning

Computer and cloud-based teaching and learning are emerging edu-tech pedagogies that have created alternative pathways to the traditional face-to-face method of teaching. The advantages associated with these teaching and learning approaches have globally endeared the techniques as new normal in providing unhindered quality education to learners notwithstanding their socio-economic and geographical limitations. However, the advent of computer and cloud-based learning has brought with it e-learning infrastructures as instructional materials to aid their implementation. Consequently, companies, governments and educational institutions have been providing these needed infrastructures for e-learning either as institutional responsibilities or as business enterprises for accessibility for educational institutions.

In line with National Policy on Education (NPE), government at all levels have provided e-learning environment at all levels of education as a policy thrust to integrate Information Communication Technologies (ICT) in the nation's educational process. In view of this the Federal Government pledged to continue to take cognizance of changes in methodology and curriculum and for teachers to be regularly exposed to innovations in the teacher profession (FRN; 2014). Constant exposures to changes in education is captured in one of the goals of teacher education (NPE; 2004) which is to provide teachers with the intellectual and professional background adequate for their assignment and make them adaptable to changing situations.

Now that e-learning technologies have made the world a global village through collaborative and cooperative education, any effective intervention has to start with capacity building of teachers. Such intervention has to start with initial and advanced training of teachers in appreciating the intricacies of e-learning infrastructure and in developing competencies in edu-tech pedagogy for no educational system may rise above their teachers.

Federal Government Education policy on provision of E-learning infrastructure in schools has to be accompanied with a corresponding building of teacher competencies on digital technology. Onboarding the Nigeria teacher in computer and cloud learning is therefore, to initiate a progressive and sustainable capacity building in Edu-tech pedagogy to drive home the policy of integrating e-learning skills amongst teachers and students. According to Siavash, Mashin & Selamat (2011), there are basic variables that directly or indirectly impact on teacher effectiveness as; teacher motivation, academic confidence and technological confidence including policy orientation. A critical examination of Siavash, Mashin & Selamat (2011) variables, highlights areas of interest for Nigeria teachers to be well oriented towards leading the way as teachers in edu-tech pedagogy of computer and cloud-based teaching and learning.

For a teacher to be motivated in the application of e-learning or ICT in the classroom, the knowledge and appreciation of e-learning infrastructures becomes necessary. Unfortunately, the curriculum of Nigeria teacher education, training and recruitment does not emphasize knowledge, competencies or skills in edu-tech pedagogy for teachers. Consequently greater percentage of Nigeria teachers in training and service are estranged in the application of technology in their subject areas in and outside the classroom. Presently, the knowledge and application of computer is only for personal use or for quite a few at all levels of education. Curriculum of education for teacher training has made provision for only computer appreciation for teachers outside the field of computer science. The course content in computer appreciation lack content for the average teacher to have the depth of digital skills to be an authority in the classroom.

The lack of confidence of teachers in edu-tech pedagogy has caused a lot of apathy amongst serving and practicing teachers with the resultant apathy or lack of interest in use of computer and cloud based learning opportunities in and outside the classroom for learners. For instance topics that could have been graphically displayed for students using powerpoints or ‘‘Data Import and Export’’ from files in Microsoft Excel spreadsheet online are laboriously talked over or skipped by teachers. Similarly, teachers play down on topics that need technology for illustration. Academic programmes, events and contents that ought to be shared with other teachers using e-learning applications are rarely addressed.

However, research has proved that educational technology as a vehicle for education goes with competencies in Edu-tech pedagogy that inform pedagogically functional EdTech teaching and learning. Philips (2022) discussing on skills that matter on empowering the next generation of change makers, observed that equipping students with digital skills for the future has given students confidence with improved skills in programming and coding, improved team work, improved communication and improved problem solving skills. This observation highlights the competencies outside the traditional teacher training necessary for both serving and student teachers. However, education as a social act in Edu-tech pedagogy has a degree of unpredictability on how students respond to a given tool or how a tool can be adapted to a particular teaching/learning environment. The competencies are expected to form the springboard with which teachers are to pioneer the hybrid of virtual learning as a flagship for Ed-tech pedagogy in schools and colleges. The innovations in teaching method demands that teachers and schools have to get out of their comfort zones and try new tools and strategies in technology, experiment with novel learning situations, and seek alternative learning pathways (Hypermedia & World Conference on Educational Telecommunications, 2011). With innovations comes the important skill of adaptability that goes hand in hand. Adapting to emerging technologies to create innovative learning experiences comes with adaptive learning environments for students and teachers.

A programme of computer and cloud based edu-tech pedagogy for teachers has to be incorporated in teacher training curriculum: such programme has to start with Knowledge-based Training on computer and cloud learning approaches. Knowledge based training focuses on core or broad based shared knowledge called computer appreciation. *Knowledge-based Training* provides organized knowledge and facts on computer systems as computer instructional content (CBT) or Computer Based Assessment (CBA) which is assessment delivered and marked by computer or computer Assisted Assessment (CAA) (Latin American Coalition for Teaching Excellence; 2022). Further learning content all teachers need for effective edu-tech pedagogy are; *Simulation-based Learning and Training*. Simulation based learning is training in virtual environment that mimics real world activities and scenarios in contrast to reading theory books or face-to-face lectures. In virtual simulation teaching, the teacher uses virtual scenarios to demonstrate realities and abstracts as in real world.

The last important stage of the e-learning programme for teachers has to be on creative and instructional games. Instructional games are software designed to increase motivation to learning by adding game rules or competition to learning activities. Further instruction under the stage has to onboard teachers on problem-solving training. Computer based problem solving is a systematic process of designing, implementing and using programming tools during the problem solving stage. The process will help teachers guide students track their progress (Warschauer; 2009).

Generally, training and competencies in digital computer and cloud based skills is to make teachers skillful in digital skills and activities as: text editing, e-mailing, internet browsing and more to advance in digital pedagogy and in making sound decisions on when and how to maximise student achievement (Latin American Coalition for Teacher Excellence, 2022). E-learning is all about sharing of knowledge and educational resources with communities of educational networks. The teacher will be exposed on how to create and edit new educational content, link and rework previous knowledge and content, make artistic productions, multimedia content and computer programming, personal protection, data protection, digital identity protection, use of security among others.

Assessment and evaluation are important aspects of teacher's responsibilities. The internet has digital tools that can help the teacher teach and evaluate students in more effective way. Such tools have a series of functions that facilitate many tasks that teachers perform as they prepare and teach classes. The Gradebook, lesson planner and school calendar can be scheduled using the computer. For instance, the Additio's functions can be used to facilitate the teacher's tasks lesson planner with platforms that create calendars and schedule events which can be displayed with a weekly or monthly view (Latin American Coalition for Teacher Excellence, 2022).

Similarly, cloud-based teaching and learning is becoming increasingly important for schools to enable remote learning as a result of the Covid-19 pandemic. Students easily access tests, assignments and texts remotely. Teachers using cloud based content tracks progress at every stage of their programme. Teachers can create their content in an authoring tool and then host it in a cloud-based Learning Management System (LMS). A cloud-based authoring tool allows one to host content and track learners' activity directly on the platform. Teachers and students with smart phones and tablets, can access teaching and learning content from preferred device. Learning content stored online are accessed by trainers to prepare lesson materials on one device and continue the process on another. This ability may be particularly beneficial for teachers that create or prepare content on both their office and home devices. E-learning content stored in the cloud instead of on a desktop learning content is continuously

backed up in case the computer crashed or formatted. Locally hosted files are at a greater risk than the cloud-based learning content which is stored safely online. To access cloud based learning content; one gets connected to another internet-connected device. Cloud-based learning platform with cloud-based tools software updates happen automatically. That means each time you log in, whether as a learner or to create content, the users are always using the latest, user-optimized version with the automated software updates.

There are basic competencies of creating interactive and collaborative presentation that demands the teacher to co-construct slides of course content with collaborators in real time with shared feedback. Interactive e-learning presentations engage participants' interaction with the presented content. Interactive e-learning elements can come in online live quizzes, polls, surveys through presentation making tools as Google Slides, for teachers to choose. It is also key digital for teachers to create blogs for educational purposes. Creating a blog or website for school and classes are one of the first things needed to encourage asynchronous internet educational service delivery. A classroom blog provides a virtual space to share teaching and learning resources with students, communicate with parents and the school community, share class news and announcements. A classroom blog empowers voice and provides students the opportunity to write for authentic audiences. Students can also use class blog as a portfolio where they can save and share their learning artifacts and showcase their scholarly achievements. Blogging platforms are simple and easy to use for they offer pre-made templates with intuitive drag-and-drop editors that allow customizing blog platforms the way one wants. Videos can also be created to satisfy the visual needs of students. Videos are powerful communicative tools that can be leveraged to accomplish various educational purposes. Interactive video contents can be used in flipped classrooms or in blended learning environments. Videos are more likely to drive engagement than text-based output because web technologies in general lend themselves much easily to audio-visual content. Videos usually embed various forms of media including text, images, callouts, shapes, arrows to get the point. There are now several web-based tools that enable teachers to easily create interactive videos to use in teacher instruction.

Nigeria teachers as part of in-service training are to be oriented on how to design engaging videos that clearly capture and communicate information. To do is to be familiar with video editing and how to use a video editor to split or combine clips, remove or blur unwanted parts in the video, apply green screen effects, insert links and text into videos, add voice-overs, insert animations, and more. Most of the edu-tech platforms do not require advanced technical knowledge to operate as it takes few minutes to learn how to navigate the interface discover the embedded tools and be familiar with its functionalities.

There is need for teacher development on creating interactive visuals that invite students to reflect, ask questions, and to use critical thinking skills to decode messages. This according to Kharback (2023) may be info graphic, a poster or pictorial language with inherent communicative power that needs to be leveraged to enhance students understanding. To create interactive visuals, there are great tools to help create professionally looking visuals to use in class such as: Google Drawings and more (Williams; 2002). The best way to go about creating visual he noted is to start with a premade template. Once visual template is selected it is customized as one wants. When the visual is completed, it can be downloaded in different image formats. Another e-learning skill critical for the teachers awareness is the skill for evaluation of digital contents while one surfs the internet as the internet is full of all kinds of information. Finding something in the internet without the help of a good search strategy can be like embarking on a journey without destination for there are so many route options. The use of search operators, Google Image search, Reverse Image search, and search

using Google Lens including Google Advanced search and many more are effective routes to information in the internet.

To search for academic literature and scholarly research one has the best option to use search engines that are academically focused. According to Kucher (2021), anyone can set up a blog in minutes and start providing 'expert' and 'insider' knowledge to a worldwide audience. Teachers' sources of information need to be accurate, reliable and credible. Critical assessment of online content starts with an investigation into the authorship of the content in question. Checking the author background to see whether the information and sources have an authority in the field they are writing about (academic credentials, publications, experience among others). Trilling (2009) believes the web sites needs to be assessed into its security (The Uniform Resource Locator; URL) including the Hypertext Transfer Protocol Secure; HTTPS) and the domain name age and rank. The older the domain name the more likely the website/blog is legitimate and looking into popularity metrics using tools Search Engine Optimization (SEO) tools. Effective operation of the search engine is necessary and one needs to knowhow to use them effectively and not to get lost trying to find researchers' destination.

The above areas are competencies the Nigeria teacher should develop competencies and skills to be able to effectively manage their classes and students in edu-technology. There is therefore, the need to strengthen the knowledge capacity of Nigeria teachers in computer and cloud based teaching and learning to increase student performance and facilitate the use of e-learning infrastructures domiciled in the schools. Teachers, both serving and in training are to be given the digital competencies necessary to use digital knowledge and skills in classroom exercises within their subject areas.

Conclusion

The 21st century teacher is challenged by the school age generation that are described as internet natives with increasing proportion of learners turning to the internet for socialization and engagement. As is a common saying for nomadic education, if you can't get them to be educated, you follow them and get them educated. The teachers with edu-tech pedagogy have to follow the learners to the internet to get them educated. This makes it imperative to onboard the Nigeria teacher in computer and cloud teaching and learning for teacher effectiveness.

The advantages of computer and cloud based-learning are their ability to bridge the gap created by face –to-face traditional teaching method. The methods help learner learn at his/her own pace notwithstanding geographical barriers. Learning virtually can be synchronous or asynchronous over and over again for new students or users. Cloud-based approach is now made popular with the challenges of COVID-19 pandemic, coupled with its versatility in reaching out to students anytime anywhere in the world.

Recommendations

- 1) Capacity training of teachers should be made an integral part of teacher education and also for continuous professional development of serving teachers.
- 2) E-learning skills application in classroom should be part of lesson plan of teachers for students to understand how virtual and cloud based learning can simplify understanding and research in their subject areas.
- 3) Teachers should constantly use digital tools and platforms to engage seminars, conferences, in-service training to be better equipped in imparting e-learning skills on students at all level of our education.

- 4) Teachers should be motivated by their institutions and government to engage in collaborative and cooperative quality projects amongst both teachers and students across institutions on cloud based platforms.
- 5) Computer and cloud based infrastructures provided in schools and colleges should be activated for use by both teachers and students and not by privileged few. Capacity building of teachers on knowledge and application of e-learning and teaching has to be continuous with emphases on use and a teaching method not for certification targeted for promotion.

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