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Digitalization in Education and Teachers' Roles in the Twenty-First Century

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Abstract

This paper examined digitization in education and teachers' roles in the 21st century. Present world realities show that education has gone beyond traditional method of teaching where the teacher uses all his energy to teach the learners through face to face classroom. A shift from traditional method of teaching to the use of digital tools and resources lead to visualization and simulation of knowledge. Visualization or digitalization is now the order of the day where the teacher and student are exposed to online teaching and learning processes, using computers and internet facilities including projector platforms. The study identified the use of digital tools in the classroom by teachers and posited that for Nigeria to enjoy the benefits of Knowledge Age and Knowledge Economy there is an urgent need to address the inadequate use of technologies in the classroom. The paper recommended, inter alia, the training/retraining of the teachers in the use of technologies through teacher education programmes and the implementation of the use of technologies in the classroom.

Key words: Digitalization, twenty-first century, teacher and education

Introduction

One of the highlights of the Nairobi Conference of 1968 was that African governments should exploit the existing television, radio facilities and other means of mass media for teaching both children and adults. The educational innovation of visualization and simulation was to prepare learners for transition from the Economy Age to Knowledge Age. The pedagogy was an emblem of digitalization in education in the 21st century. Teaching in the 21st century has been facilitated by the use of technologies. The declining state of our educational system has become a thing of great concern to many. An educational system that facilitates and promotes the vital skills needed to adequately equip learners for the future is what Nigeria needs. This will enable Nigeria join the league of nations that are enjoying the benefits of sound educational system. The methods, innovations, curriculum and assessment that made the 20th century education a land mark was designed and infused with an emphasis on the 3R's of basic education which were: reading, (w) writing and (a) rithmetic. Those methods produced the envisioned products;

graduates that were skilled for the industrial age (Kivunja, 2014, 2015). The beckon for 21st century knowledge framework indicates that present day education has failed to equip students for the challenges of the 21st century education the structure, organization and format are not different from those of the 20th century (Kristan, Punya, Chris & Laura, 2013). The 21st century learning is a vehicle through which the following survival skills are delivered: collaboration, critical thinking and problem solving, agility and adaptability, entrepreneurialism and initiative, effective writing and oral communication, imagination and curiosity and accessing and analyzing information. This knowledge age points at more advanced technology (Digital Technology, aka Digitalization) now than in the 20th century.

Digitalization

Digital means using computer technology or simply, providing a reach out in numerical digits, characterized by electronic, especially computerized technology. Digitalization implies a process/system characterized with computer technology or electronic computerized technology. This can be described as Age of digitalization simply emphasizing electronic/computerized technology. The education system of any country at this period should be tailored towards digital technology for quality to be maintained in the system.

The 21st century digitalization education demands a mastery of the core subjects, innovative skills, digital literacy skills, career and life skills. A popular quote has it that:

As this generation's students are not born to be confined by the limits of simple learning; their curiosity is vast and cannot be catered for with educational systems that were designed earlier. If we kept on teaching our children the way we taught them yesterday, we would deprive them of their tomorrow. Our old educational system lacks the capability to stand a chance in the 21st century so we are compelled to use digitization in our educational system (Santosh, 2019: 123).

There has been a paradigm shift from teacher centred education to child centred education. 21st century education needs to emphasize child centred education. In the past, students relied on teachers, school's management and well written professional text books as the major primary sources of educative and accessible information while at school. Nowadays, the internet has to an extent replaced the school as the direct source of information to the students. The internet provides students with information wherever and whenever they can connect to the net. Students can now learn anywhere in their homes, restaurants, buses, etc. In addition, they learn/gain not only reading prints in black and white but also the digital tools give them information packaged in a more attractive way with full colour, in graphics, video and stereo sound. Students learn through various sources. For this reason, the place of ICT and multimedia cannot be overemphasized. Many countries understand this and they effectively exploit technology while other countries are still grappling with the educational structures that were designed for a past age.

Countries with high educational performing systems such as Finland, Singapore, America, Japan, etc were able to achieve those enviable educational systems through their teachers, policy makers and other stakeholders in education. When government invests in teacher education, it promotes national development. UNESCO in their education report in 1998 stated

that digital technology and the internet must be made available for teachers and learners in the classroom, school and teacher education institutions. Also, teachers must be skilled in the use of digital tools to assist all learners achieve high academic standard. The success and achievement of producing professional teachers depends largely on the extent of ICT integration into teacher education programme. The Conference on Education and Scientific and Technical Training in Relation to Development in Africa (1968) in its 5th recommendation stated that the massive dependence of African nations on imported technologies and expatriates is a pointer to the inadequate facilities in secondary and post secondary schools enabling learners to develop a scientific mind and technical skills for application. With the advancement in telecommunication networks such as cable networks, T.V, internet, digital media, twitter, etc., the classroom might go beyond the four walls of the class, where tele monitoring interaction with other participants (learners) can begin and grow.

Digitalization in Education

Digitalization in education implies the use of computers such as laptops, desktops, etc and mobile devices, the internet, software applications and other types of digital technologies to teach students of all ages. The place of digitalization instructional or learning materials cannot be overemphasized. Learning materials is a term which encompasses all the physical materials which a facilitator uses to transmit instruction and facilitate learners' achievement of instructional objectives. Instructional materials can be grouped according to types. They are:

- Prints: Text books, handout, manuals, pamphlets, study guides, etc.
- Visuals: Charts, photographs, transparencies, real objects, etc.
- Audios : Microphone, radio, cassettes, etc.
- Audiovisuals: Tapers, films, slides, film strips, multimedia, television, video, etc.
- Electronic interactive: Computers, tablets, graphing calculators, etc.

Warschauer, Zheng, Niiya, Cotton and Farkas in Amy, Mathew, Jcovina, Russell and Christiana (2016) stated that many students do not have regular and reliable access to a computer; so, inconsistency in computer access makes it difficult for facilitators to integrate technologies into their lesson plans. Ertmer in Amy, et al (2016) noted that lack of technological implementation in the classroom is due to inadequate professional development and training.

Benefits of Digitalization in the Classroom

The educational innovation of visualization and simulation of information help prepare learners and make learning concrete which is what learners need in this knowledge age. The benefits of digitalization in the classroom are as follows:

- It makes learning fun and interesting: Subjects that seem difficult, boring or challenging become interesting to the students when videos, tablets or laptops and other electronics are used.
- It prepares the learners for the future: The use of technology will help prepare learners for the digital future. Job that may not have had any digital link over the years may now have in this recent time. With technologies learners will be able to solve complex problems and collaborate with others.

- Improves retention: Digitalization of lessons helps learners to remember what they have learnt.
- It helps learners to assimilate at their own pace: Digitalization helps learners to learn at their own pace. Learners have different abilities and so they learn in different ways (different styles) and at different speeds. Having access to the internet exposes students to a range of resources that will enable them carry out a research in different ways and this in turn increases their participation. Apps in the internet allows for individualized instructions. With these apps, the needs of individual learners are met. It also helps teachers to carry out one on one teaching with learners who might be struggling to learn effectively.
- It connects with students: Students spend more time on internet than in any other thing. When they are not in school, the possibility that they are on net is very high. By integrating technology into the classroom facilitators are not only helping the students they are also helping to concretize the lesson.
- Improves engagement: It helps to teach same thing in different ways. Lessons can be taught through games, matching of items, etc. It can encourage students to participate more in the learning activities which could have not been possible through a traditional teaching environment.
- It encourages collaboration: Collaboration skills are practised when learners are involved in different online activities with others working on projects or sharing materials or documents. Technology encourages collaboration in the classroom, same school or classrooms and schools around the world.
- Learning of life skills: Learners can learn life skills through the use of technology. Life skills such as creating presentations, the ability to sieve and differentiate between reliable and unreliable sources on the net, writing e-mails, etc. These skills can be learnt or developed in the classroom.

Benefits of Digitalization to Teachers

It helps teachers to provide students with additional skills to find answers to complex problems through the use of Bloom Taxonomy:

Create: Produce original work

Evaluate: Justify a decision

Analysis: Explain ideas/concepts

Synthesis: Link ideas to form new whole

Application: School better understanding and ability to summarize

Knowledge: Recall facts

Bloom in Lord and Baviskar (2007) opined that there was an alarming gap between students' ability to grasp basic principles and their ability to apply the information acquired or explain the knowledge acquired. Since learners are examined on their ability to recall the knowledge acquired especially in sciences, learners focus on studying definitions and terms and little

attention is paid to application and analysis. To correct this, teachers' instructions are given to cover from the lower to the upper levels of Bloom's taxonomy.

It enables teachers to upgrade their knowledge after which they can then transmit to students. Digitalization make possible for teachers to carry out research on related topics so as to be well equipped and in a position to disseminate knowledge to students.

It enables teachers to discover answers to problems. Collaboratively, they join other experts in other communities and share their ideas. When teachers exchange views on some subjects and topics on a platform it enables them exchange experience, they learn new ideas and pedagogies on how to disseminate knowledge.

It provides teachers the opportunities to use search engines to find information to enrich the content of their lessons. It also makes the teachers and learners work hard or search for information instead of waiting only on the teachers.

Teachers' Roles in the Twenty-First (21st) Century

The Teacher Registration Council of Nigeria (TRCN) was established through Act No 31 of 1993 in the Republic of Nigeria to regulate and control the teaching profession at all levels of education in Nigeria. Also, to ascertain the skills to be acquired by teachers seeking to become registered as professional teachers and to raise the standards from time to time as circumstances may require. One of the prerequisite skills of the 21st century teachers is the knowledge to use digital tools and resources. The following are the roles of the teachers in the 21st century among others:

- They should use technologies and computer mediated methodologies in the classrooms.
- As a facilitator of learning the teacher displays teaching skills as well as networking, communicative, nurturing and thinking skills in their classrooms
- Teachers should listen to students, interact and engage them in discussions instead of lecturing.
- Instead of guiding them to memorize information, teachers should teach students critical thinking skills
- Teachers are not to promote one-size-fit-all form of teaching; individual needs should be taken into consideration and met.
- Teachers should create enabling environment for students to collaborate among themselves and with others outside the school.
- They need to instruct students on computer usage.
- They should be knowledgeable and willing to apply their knowledge to their classroom.
- They should understand different learning styles and be able to identify the learning styles of their students.
- They should play the role of resource for students and guide through the difficulties of life.
- They should introduce learning strategies that involves assignments on net, active learner classroom in which learning activities are customised to meet the needs of every individual in the class.
- They should teach students to evaluate and question their sources.

- They should generate learning activities that will help students to adopt new level of creativity.

The teachers' roles of the 21st century is not limited to the ones identified in the Acts No 31 of 1993 in the Republic of Nigeria to help to regulate and control what digitalization process geared towards to achieve. To put differently digitalization can help the teacher and others in educational institutions and any other business organizations.

First, it helps the teachers effectively perform content digitalization services. This mainly considers the content evaluation and the transformation of knowledge assets. This is a kind of digital content creation and conversion. It develops creative and e-learning as solutions tailored to individual organizational or institutional needs.

Another vital function of digitalization which helps the teachers perform their roles is the building of an organization or educational institution capable of learning faster which makes workforce develop the vital knowledge required to enable the institution win the public confidence. It also creates value, achieve high performance and develop certain key knowledge areas among the teachers and enable the teachers perform effectively to improve the performance of the students/learners. It brings about knowledge of compliance and regulation of policies among the employees/teachers and learners. Digitalization enhances e-learning which provides institutions with the opportunities to develop or train both teachers and learners by creating cost-effective platform for purpose of training/educating them no matter the location, time and the size of class.

Digitalization encourages efficiency and innovation and makes automation possible. Apart from e-learning and teaching/learning effectiveness, it helps the school administrators/teachers in many ways. The business organizations find it most efficient and cost-effective in an overall business growth. To the teachers, digitalization with its tools is the builder of most efficient and effective teachers for effective learning by the learners. It helps the teachers as stated earlier, transform the entire system of education perhaps from analogy to a digital one where teaching and learning become fun and achievable to the teachers as well as the learners.

Digitalization: Key to Educational Innovation

While other industries are experiencing massive changes, education is one of the last industries to make this informative change. The reason could be that most teachers want education to be taught with antiquated methods, skills and practices. The influx of digitalization in education has made teachers to have a review of making transformative changes in their institution and classroom management. Digitalization does not only help to enhance interactive sessions in the classroom but also promotes collaboration. It helps to consolidate learning, making learning easy, fun and exciting through augmented reality, virtual reality and mixed reality. These were made possible through apps such as Unimersity and Cospaces that can help learners have a glimpse of past realities as well as showcase their creations to the world. With digitalization, learners can learn at their own pace; learners learn more through discovery than direct instruction from the teachers.

Challenges of Digitalization in Education

Despite the awareness and widespread adoption of the use of technologies at different levels of education, significant constraints are preventing the effective implementation of the use of these technologies. These are the constraints, among others:

Finance

The resource to purchase technological tools for teaching and learning is most time inadequate. Trying to get students to collaborate or be engaged in learning activities with little or no computers, laptops, tablets, etc is futile. In addition, trying to do class work on a couple of computers with 30 students will be extremely difficult if not impossible. Also, technology is changing rapidly, upgrading equipment is costly and most times, schools might not have adequate finance to do this. Most classrooms have 25-30 students which when engaged to use computers can take up a huge amount of internet bandwidth in the period they are using the computers, laptops, etc. Furthermore, most students could not do homework at home because their parents could not afford to buy laptops or computers for them. Osaat (2012) writing on financial crises in Nigerian universities and the imperativeness of alternative sources of funding lamented the paucity or dwindling nature of material and funding of the university education in Nigeria. He remarked that, 'Nigeria's universities have been in chaos and in a serious mess just because of inadequate funding. The lingering financial distress has impacted negatively on virtually all facets of university development and national economy'' (2012:276). Also, NUC (National Universities Commission) (1991) report showed that funding pattern of the Federal universities in Nigeria by government has been meeting only about 53.1 percent of universities' needs within the period (1980-1990). This challenge has not ceased and it would impact negatively on the implementation of Digitalization policy if not nip in the bud.

Professional Development

Lack of adequate in-service or ongoing professional development on the part of the teachers will not help them to be effective and relevant in the classrooms. Teachers who are the facilitators of learning are required to integrate new technologies into teaching activities. Most times, the teachers do not have the digital tools, they can hardly comprehend the new technologies they are required to use or they are unprepared to use them. In personalized /individualized learning the teacher needs tools and expertise knowledge to promote learning (Osaat, 2010).

Lack of Training Opportunities in Teacher Education Programmes

The expectations for teachers are high. Without adequate training in the use of technologies in teachers' education programmes, teachers will not be effective and efficient in the use of technologies in teaching and learning. In teachers' education programmes, teachers are not given sufficient training and adequate technical support that they need to function with. Also, with many courses to cover, there is insufficient time to practice the new and ever-changing technologies. The basic skills for teachers of the 21st century will include basic literacy skills and for teachers to apprehend the benefits of technologies. They need to appreciate the benefits of technologies as a tool needed for teaching and learning. In sum, lack of instructional materials, ability and interest in utilizing instructional materials and very importantly, shortage

of qualified teacher as well as absent of training and retraining could affect digitalization process (Osaat, 2015).

Resistance to Change

Some teachers and school administrators resist change if they believe that the change will overhaul a system and pose some challenges or problems without looking at the benefits especially in the long run. They prefer to operate from their comfort zone. Osaat (2010), averred that some teachers are resistance to change for reasons such as lack of motivation, lack of retraining, inability to engage in relatively time consuming and difficult tasks especially in the teaching of mathematics and some science subjects. They often view technological experiments as not part of their job descriptions. The implication of this is that computers and other technological tools are underutilized, not used at all or are used in teaching in such a way that does not show that it is a new innovation meant to engage students.

Traditional Method

Traditional method of teaching and test models do not challenge students to experiment using technological tools and resources. It does not allow students the opportunity to engage in formal learning. The students should be taught with modern methods blended with digital technologies. This new approach can make the difference in teaching and learning. Innovation should also be introduced in testing models to match the digital technologies invoke. Osaat (2015) identified lack of instructional materials, utilization and interest in the use of instructional materials affecting digitalization in particular and ICTs in general. The trends must change for an improve teaching and learning as one of the benefits of digitalization in the 21st century era.

Personalized Learning

Technological tools and resources such as computers, laptops, tablets, etc are needed to help students to learn at their own pace as well as concretize learning. Differentiated instruction help to meet the educational needs of each child but the tools needed by teachers to achieve this is inadequate and most times are not available. The teacher needs tools and expertise knowledge to be able to guide / promote personalized / individualized learning (Osaat, 2010).

Lack of Balance between Technology and Instruction

The same way some schools consider the type of calculators' students should be allowed to use in the class to solve problems in Mathematics as to help the students that are finding the subject difficult, so also do some schools consider apps that give quick answers to problems that students should apply to enhance critical thinking skills and provide possible solutions to problems. The issue or challenge of lack of balance between technology and instruction is to a large extent dependent upon the teacher's ability in effective teaching and management of students' classes. It gives rise to the issue of myths and realities in the teaching and learning of mathematics (Osaat, 2015). Also, the issue of what technological device the students should use to solve a mathematical problem depends on what the teacher wants to achieve in a particular lesson. So, the issue/challenge on balance between technology and instruction rests on the effectiveness of the teacher.

Distraction

Many teachers think that tablets, smart phones with internet connections and text messaging services are sources of distractions to students as opposed to being learning tools. It will be difficult for teachers to monitor a large class closely to ascertain whether they are using educational apps on their laptops or smart phones or browsing the facebook. To checkmate this, the teacher might decide to use filtered browsing on the devices to cut off distractions but it might not be possible if the students own the device. The teacher should rather cater for contents and introduce appropriate methods that would be digital based and highly required by the students to make the lesson interesting. According to Osaat (2010), distraction really depends on how good the teacher is in his teaching methods, maturity in handling issues, his intellectual ability, number of learners in the class and how effective he is in supervision and control of the class.

Lack of Information Technology (IT) Support

The rapid changes in technological development will require schools using the new technologies. This adds pressure to the IT departments. For any IT department to be effective it will require more hands to be employed. Inadequate finance in a school will not support this employment (Osaat, 2010, 2015).

Recommendations

- The government should subsidize or make adequate provision of digital tools to enable quick and easy access to these tools. This will help speedy facilitation of digitalization in education.
- Technology and digital resources are highly expensive, therefore; schools should seek for aids and community support for finance.
- The educational policy makers, school communities and stake holders in education should provide lots of information, statistics, etc to show the schools and communities why technological tools should be implemented in the classroom.
- As technological tools are rapidly changing, the school should have a budget and plan on how to upgrade technology.
- To address the problem of unequal access to technological tools, the school should provide students with laptops or tablets so that they can effectively work at school or home.
- The training of how to use digital tools should be implemented in teacher education programmes and teacher in-service trainings.

Conclusion

Students thrive when allowed or given the opportunities to use technological tools to enhance their learning experience. Communication method of teaching learners (traditional method of teaching) without the opportunity for feedback does not help learners assimilate what was taught because there is no promotion of retention of knowledge. The most effective way to facilitate learning is to create a conducive learning environment and expose learners to the use of digital tools by engaging them in learning activities that involve the use of these tools. The use of computers or computer aided technologies in teaching and learning will facilitate digital literacy skills that will complement the core subject skills needed to equip students for the knowledge Age. The digitalization in education is bequeathed to the present generation with

lots of challenges such as finance, resistance to change, lack of training in the use of digital tools in teacher education programmes and teacher in-service trainings. Also, if the application and the use of technologies are not fully employed in classrooms, then the students will not be equipped for the challenges of the 21st century education, and they will be lacking the survival skills of collaboration, critical thinking, problem solving, etc. which are keys to educational development of any nation. Digitalization in education is central in preparing students for the future as well as helping teachers to be relevant in the 21st century education. Nigeria has made some progress but she is yet to reap the benefits of digitalization in education. Giant strides should be taken by government and other stake holders in education to ensure that digitalization is seen and applied as an innovation in education.

It is believed that financial challenge to a high extent could be addressed, if schools should seek for aids and community support; for unequal access to technological tools, schools/hosting communities should provide students with laptops, or tablets so that they can be effectively engaged at school or at home. The success and achievement of producing professional teachers with basic literacy skills depends largely on the extent of ICT integration into the teacher education programme.

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