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PARADOXES OF THE USE OF TECHNOLOGIES IN SECONDARY EDUCATION SYSTEM IN AFRICA

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Abstract

The study examined the paradoxes of the use of technologies in secondary education system in Africa, through a systematic review. Materials and information resources used for this study cover the period between 2015 and 2020 to give room for the technological transformations that have occurred particularly during the global economic crisis from a local, regional and global perspective and their application in the education system which also includes the secondary school education system. Also, the content of relevant information obtained was subjected to thematic analysis, and a systematic review of relevant articles and information was done to drive the relevant argument of the study in order to achieve the purpose of this study. While technology usage is very germane to the education system of Africa, and presents a wide range of benefits, it could also pose a negative effect on the students, the schools and the education system. These negative effects have the elastic tendency to even erode the positive effects in the long run hence, causing a drastic negative effect on the students, the schools and the education system of Africa. To this end, the study recommends that students should be hindered from bringing and using personal technologies in class and during exams hence, the possession of these technologies by students in schools should be totally eliminated in schools.

Keywords: Technology Use, Education System in Africa, Secondary School

Introduction

The past decades have seen and embraced the digital revolution which has affected the global, regional and national economy. Technology which cuts across the internet, social networking sites, e-mail, mobile phones, CD-ROM, DVD, and handheld personal devices, among others has become a part of everyday activities (Omiunu, 2017). **Critical sectors** such as transport, health, finance, and education have increasingly **depended on these digital technologies** to run business activities and also drive the use of innovations towards enhancing objectives and goals (Soffid, 2021). In the educational system, Ifijeh, Michael, Onuoha, Ilogho and Osinulu (2015) revealed that they are powerful tools that increase access to and improved quality education. Therefore, it is deployed to help to enhance effective learning environments in schools (Omiunu, 2017). According to Moreira and Corso (2019), most educational technologies are characterized by their portability and constant connectivity that, tend to influence positively their usage, as well as their usage expectation in the education system.

Despite its benefits, enormous opportunities and its provision of solutions accruing to the deployment and use of ICT in the education system, technology also has its negative sides hence, the paradoxes of technology in human society (Omiunu, 2017; Soffid, 2021; Singh, 2020). Most of the studies focusing on the use of technology, particularly in the education system approach it from the positive and opportunities it provides to the system but very few identify its negative perspective to human society (Moreira & Corso, 2019; Abrami, 2020). This has really made it impossible to enjoy the benefits of technology to its fullest due to the lack of understanding of the paradoxes of technology.

The concept of "paradoxes" in this study implies possessing both positive and negative or combining contradictory features or qualities. With regards to technology use, paradoxes of technology imply that technology possesses or combines both positive and negative features or qualities. Therefore, in trying to deploy and use it, focusing on its positive aspect and not being familiar with its negative qualities might lead to a situation whereby the society experienced a mixed result or pseudo-result (false result). A society that would fully enjoy technology and its benefits is a society that puts into consideration both its positive and negative sides towards cushioning the prevalence of the negative aspect and leveraging on the positive aspects towards achieving better goals and objectives.

The positives and benefits of technology use in the education system are well provided in the literature. For example, the use of smartphones, software and tools for academic purposes and creating presentations and also aiding in writing school projects, dissertations and theses (Moreira & Corso, 2019). Also, tablets, PDAs (personal digital assistants), notebooks, and net books, among others, are also ubiquitous in the education sector. In addition, the use of technology in the education system tends to enhance critical and cognitive thinking, communication skills, possession of soft skills towards increasing employability of students after leaving school, increasing personal and school productivity, time management, class and students management, distance education system, among others (Simendinger & Stibe, 2016).

Also, it enhances teaching and learning and increases pedagogical strategies in teaching as teachers may post questions online where students can contribute particularly in distance learning education. Such questions and contributions have been found to be better than those that occur in traditional classes (Omiunu, 2017).

Digital technologies also strive to eliminate waste thereby increasing the production and efficiency in the education system during use (Haleem et al., 2022). In addition, it is a source of knowledge providers, information creators, a mentor, and an assessor (Haleem et al., 2022). Also, students depend on the use of some form of technology on a daily basis which includes texting, social networking, and web surfing towards enhancing their educational goals and objectives; it can transform the classroom into an interactive learning environment; used to deepen students' engagement in class towards the enhancing of critical thinking and problem solving (Costley, 2014).

Also, Omiunu (2017) has drawn attention to the negative effect of technologies particularly in the education sector which tends to cause greater harm than its positive impacts. On several occasions, students have reported such technology devices could distraction in the classrooms, and students may use technology at night and fail to sleep which may distort the daily school activities thereby affecting the performance of the student in the long run (Omiunu, 2017). Therefore, there is indiscriminate use of technology by students which has even led to a lack of discipline in the classroom, and even death in most cases. This could lead to underachievement of the goals and objectives of the schools and in extension the Nigerian education system (Omiunu, 2017).

Also, the other side of technological advancement is that while developed countries could embrace the deployment and use of technologies in their education sector, other countries of Africa, are poor and least developed and may find it difficult to adopt these technologies due to their increasing cost. However, few countries in Africa have made significant progress in the deployment and use of technology in their education, but the quality of schooling in these regions is still challenging because of very low foundational and technological skills even among the teachers (World Bank, 2018; Abrami, 2020). This is another side of the negative perspective of technology development in Africa.

Ayo-Ayinde (2022) noted that education is an important pillar for development because it provides relevant human resources and skills that could be used to foster development in a nation. However, putting into consideration the negative effect of technology, it is important to draw attention to the fact that achieving development in the education system in Africa may be a mirage if the use of technology is not well channelled appropriately to the education system and for education purposes. Hence, juxtaposing the two facets of educational technology in the education system, it is important to understand the negative side of technology towards ensuring that technology meets educational purposes and objectives hence, the need for this study. To this end, this article, through a systematic review provides the paradoxes of the use of technologies in secondary education system in Africa. The major questions this study seeks to address include:

- i. What are the positive sides of technology to the secondary education system in Africa?
- ii. What are the negative sides of technology to the secondary education system in Africa?

Literature Review

Numerous studies have itemized the effects of technologies on school system, which also include secondary school education system. Singh (2023) examined the positive and negative impacts of technology on education, and revealed the several benefits that technologies bring to education, and include providing ease of access to Information which include those provided on the internet, making learning easier, enhancing creativity in students, and enhancing teaching and learning in the classroom.

Also, Allison Academy (2023) examined the advantages and disadvantages of technology in education, and related that although the education system which includes the secondary school education system is strongly influenced by dynamics technological innovations, but the dynamics of technologies have led to elastic shifts in the ways the teaching and learning process are been carried out in different school which includes secondary schools in Nigeria. Allison Academy (2023) revealed that the benefits and positive effect of technologies to education system, and in extension to secondary school education systems are to:

- Provides better interactive and teaching and learning experience in the classroom,
- Provides access to unlimited and most recent information and data from a variety of sources that could further boost the quality and precision of what such information and data are to be used for.
- Teaches students to be digital literate,
- Reduces the educational costs in the education process,
- Provides a better insight into performance of student,
- Students can also have the opportunity to choose between the real-time learning or to learn at their own pace hence, bridging the inequality gaps in access to secondary education.

According to Lim (2021), several benefits of technology to education can include:

- i. Technologies used in education could offer a wide choice of educational materials that could be easily accessible. Several educational technologies available offer students a very wide range of educational options; hence, students can choose the best educational options such as online journals, online books, online web pages, etc. to enhance their learning needs in the short and long run. This could help students to develop different skills and knowledge towards becoming good professionals especially in their choice field of study.
- ii. It can also help to improve the communication skills and performance of students in school and also in extension in the workplace in the long run.
- iii. It can also provide fun and an engaging learning and classroom experience for students, hence enhancing concentration and motivation in the classroom.
- iv. It allows students to access the Internet from anywhere and also at any time, irrespective of places or time. Educational technology could allow students to connect with the internet in the classroom, school, or at home.
- v. It can also help students learn new skills and acquire new knowledge which could be of use later in their life endeavours.
- vi. It could allow students to improve themselves in mental and physical aspects of their lives.
- vii. It can also assist students to stay up-to-date with new technologies that could be of benefits to their education.

Also, with respect to the negative sides of technology to the secondary education system, studies have also revealed few areas how technologies could pose negative effects on students and on secondary school system in the long run. Alhumaid (2019) provided four ways that technology could pose negative effects on education, they include:

- It could deteriorate students' competencies in reading, writing, and arithmetic. In education, these three aspects are basic three skills any student could possess for better success;
- Dehumanization of the education system in several environments and has distorted the relationship between the teachers and students;
- It could also cause isolation of students in a digital and virtual world that could distance them from social interaction;
- It deepens social inequalities particularly between those who have the technologies and those who do not.

Also, Walia, Saini and Kaur (2021) examined the positive and negative effects of technology on education, and found that when students use technology a lot, it could:

- i. Make students forget spelling different words, using proper alphabet, or writing in cursive.
- ii. It could also enhance the incidents of cheating in examinations. For example, technologies such as graphical calculators, high tech watches, mini cameras, among others could be great sources for examination malpractices for students.
- iii. It could also create a lack of attention in class especially when students use SMS (text messaging) in class and watch movies or play games during classroom lectures.
- iv. Students have given much time to watching movies or playing games than to read their books, hence, there is a long term effect of these on the academic performance resulting in poor academic performance among students.

Methodology

This article deploys the systematic literature review method, and information resources from both traditional and internet resources was harnessed and used to provide answers to the objectives of this study. Also, materials and information resources used for this study cover a wide range of periods towards the articulation of the development and effective use of technology and their applicability in the education sector for effective teaching and learning. However, the information and material used for this study are deemed important to be recent and must relate to the theme of this study.

Materials used to cover between 2015 and 2020 to give room for the technological transformations that have occurred particularly during the global economic crisis from a local, regional and global perspective and their application in the education system which also includes the secondary school education system. Also, the content of relevant information obtained was subjected to analysis, and a systematic review of relevant articles and information was done to drive the relevant argument of the study in order to achieve the purpose of this study.

Results and Discussion

The result and discussion of this review study are presented in two sections based on the two research questions of the study directed towards examining the paradoxes of technology usage in the education system in Africa.

Research Question One: What are the positive sides of technology to the secondary education system in Africa

Several positive sides and benefits of technology to the education system have been itemised and could be of benefit to the secondary education system in Africa. For example, Globalowls (2023) revealed that educational technology could help in:

- i. Equip students with technical skills,
- ii. Enhances learning and facilities for students
- iii. Broadens the minds of students
- iv. Positive Effectsof Chat GPT on Students

Also, technology unlocks keys to learning with all students, including students with special learning needs, increased student motivation; increased student engagement; increased student collaboration; increased hands-on learning opportunities; allows for learning at all levels; increased confidence in students, and increased technology skills.

Raja and Nagasubramani (2018) examined the impact of modern technology in education and revealed that modern technology impacts the educational sector in the following ways:

- a. Provision of enhanced teaching and learning such as the use of digital cameras, projectors, mind training software, computers, Powerpoint presentations, and 3D visualization tools, among others. These technologies enhance students' participation in the classroom and teachers make classes more interactive and interesting through these technologies.
- b. Globalization cuts across when school in different parts allows their students to "meet" their counterparts through video conferencing without leaving the classroom.
- c. No Geographical Limitations, with the introduction of online degree programs which hardly present the need of being present physically in the classroom. Hence, distance learning and online education have become very important parts of the education system.

Other benefits include online degrees with the use of technology, Internet connection and round-the-clock connectivity, and the use of projectors and visuals, among others.

Kishore (2018) investigated the positive impact of using technology in the education system, and revealed several ways technology could improve education, and include:

- a. The teachers can communicate with each other across the world, process their work online and provide students with the best teaching.
- b. Technology gives students immediate access to a quantity of quality information leading to learning at much quicker rates than before.
- c. Provision of resourceful information on websites available on the Internet for both teachers and students.
- d. Has made online education official and has changed the way education is run.

Chazen (2023) revealed several other benefits of educational technology as include:

- Students have access to e-books, virtual books and audio books, giving them great educational options.
- Improved teaching operations by the adoption and use of various pedagogical teaching and learning technologies that encourage collaboration, efficiency, and diversity,
- Teachers can collaborate with fellow teachers, towards ensuring the success of the school and the achievement of educational goals and objectives.
- The increase in accessibility and assistive technology opens opportunities for student populations that were previously left behind in the traditional era, and
- Provides a distance education and e-learning system that tends to enable creative collaborations and enhanced learning experiences

Walden University LLC. (2023) provides the top five benefits of technology in the classroom, and include:

- i. Creates a more engaged environment
- ii. Incorporates different learning styles
- iii. Improves collaboration
- iv. Prepares Children for the Future
- v. Connects you with students

Also, Lim (2021) examines how important technology is in today's education industry and reveals that:

- i. It offers a wider choice of materials that can be accessed easily,
- ii. It helps improve learners' communication skills and performance in school and workplace settings,
- iii. It provides a fun and engaging learning experience for students,
- iv. It allows learners to access the internet from anywhere at any time,
- v. It helps learners learn new skills and acquire new knowledge,
- vi. It allows students to improve themselves both mentally and physically,
- vii. It helps learners stay up to date with new technological advancements.

Research Question Two: What are the negative sides of technology to the secondary education system in Africa

Also, the negative effect of technology to the education system has been itemised to the secondary education system in Africa. For example, Globalowls (2023) revealed that the negative effects of technology on students are:

- a. Decrease social skills and increases laziness,
- b. Could be very distracting
- c. it could affect the health
- d. Negative Effects of ChatGPT on Students

Raja and Nagasubramani (2018) examined the impact of modern technology in education and revealed the negative impacts of modern technology on the educational sector as follows:

- i. Declining Writing Skills: Due to the excessive usage of online chatting and shortcuts, students lost writing skills quite tremendously. Students also rely more on digital communication hence, depreciating their writing skills. Also, they lose the spelling of different words.
- ii. Increasing Incidents of Cheating: Technological developments such as the use of graphical calculators, high-tech watches, mini cameras and similar equipment have become sources to cheat in examinations leading to examination malpractices. These technologies also made it easier for students to write formulas and notes on graphing calculators, thereby reducing the chances of being caught.
- iii. Lack of Focus: the sending of SMS or text messaging has orchestrated playing with cell phones, iPhones day and night, and even very often even during lectures. This has led to a lack of focus and concentration in academics which could lead to a reduction in academic performance in the long run.

Padmanabhan (2020) examined the advantages and disadvantages of using technology for the teaching and learning process in education and revealed the negative effect of technology in the education system as the causes of distraction while in class, accessibility of unsuitable content which could also affect students, false information on the Internet, affects basic skills such as cognitive and thinking, writing skills, problem-solving skills, among others, need high maintenance and updating cost to run technology usage in education.

Singh (2023) examines the positive and negative impacts of technology on Education, and presented that:

- i. It could kill Social Skills,
- ii. It could lead to distraction, particularly in the classroom
- iii. It could hinder student's interpersonal skills
- iv. it also affects health
- v. It wastes students' time hence, in the long run, it may affect students' academic performance because students may eventually waste more time on chatting, playing games, and watching movies thereby leading to the use of reduced time on students, academics.

Also, the excessive use of technology could affect the health of students badly in the following ways:

- i. **Physical effects may include** obesity, lesser blood circulation, curved backbone, bad body posture, headache, and poor eyesight.
- ii. **Mental effects or psychological issues may include** distraction, depression, and anxiety.

Also, Omiunu (2017) did a paradoxical modelling of the negative uses of ICT and their Implications among Secondary School Students in Nigeria and presented a model for the Negative use of ICT by students and its Implication as presented in Figure 1.

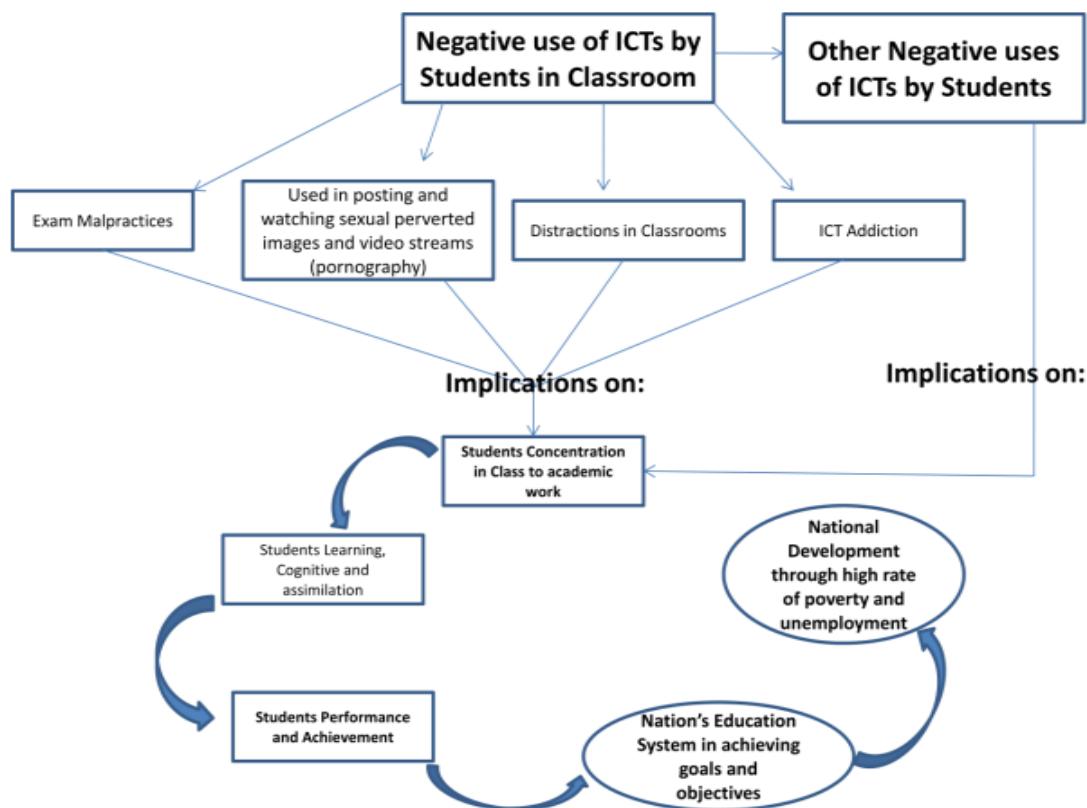


Figure 1: Paradoxical Model of the Negative Uses and Effects of ICT by Students and its Implications

Source: Omiunu (2017)

According to this Paradoxical Model of the Negative uses and effects of ICT by students, in a hierarchical order, the negative uses and effects of technology on students could pose significant effects and reduce:

- i. Students' concentration on academic work
- ii. Students' learning, cognitive and assimilation,
- iii. Students' academic performance and achievement,
- iv. The nation's education system in achieving its goals and objectives, and
- v. National development through high rates of poverty and unemployment

This implies that, besides the positive aspects and the benefits that technology could bring to students and the education system, it could also have negative effects of students and the education system, particularly those in the secondary school education which could affect a wide array of issues in their lifetime.

Conclusion

In conclusion, it is germane that the stakeholders of the education system in Africa understand the paradoxes of technology use in the education system if the region must fully

tap into and enjoy the benefits that technology brings to educational development. This could assist teachers, parents, governments, policymakers, and international bodies to be able to provide policies that could help in the effective usage of technology towards ensuring the achievement of educational objectives in Africa. It could also help to cushion the negative use of technology particularly among students. Therefore, the use of technology in the education system could be able to bring personal, societal and national development.

To this end, the study recommends that:

- i. Students should be hindered from bringing and using personal technologies in class and during exams hence, the possession of these technologies by students in schools should be totally eliminated in schools.
- ii. Also, policymakers in Africa should address the negative use of technology among students and also ensure a high level of compliance to the policy by educational bodies, policymakers, government, students and schools that would reduce the negative use of technology by students in the school
- iii. Also, parents should monitor their wards to ensure that students use technology mainly for academic work. However, the use of technology for social, and personal interest should be allowed by parents but should be subjected to monitoring by giving them limited time to spend with it after which they go back to their books
- iv. Secondary Schools should ensure the need for technology laboratories and teachers should be involved in the monitoring of the use of ICT among students in schools.
- v. Schools should endeavour to train their staff in the effective and innovative use of technology for academic purposes that could attract the attention and interest of students.
- vi. Teachers should give students assignments and class work that could make students deploy and use technology for educational purposes thereby giving them the opportunity to use them in a negative way.

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