

INNOVATIVE TECHNOLOGICAL APPROACHES FOR ENHANCING TEACHING AND LEARNING TOWARDS SUSTAINABLE DEVELOPMENT IN POSTCOVID-19 NIGERIA

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Abstract

This paper examined the relevance of innovative technological approaches for enhancing teaching and learning towards sustainable development in Nigeria PostCovid-19 Nigeria using the descriptive qualitative research method. The paper provided sound clarification on the concepts of teaching, learning, technological innovations and sustainable development, and revealed that due to the corona virus pandemic, a lot of human activities were disrupted including teaching and learning processes which brought about the adoption of the use of technology in teaching and learning processes. The paper emphasizes the need for all educational institutions, educators, and learners to adopt the use of technology in order to improve their digital skills in line with the emerging global trends and realities in education. Hence, the paper recommends among others that the integration and adoption of technology in our educational institutions is no longer a choice, but a need to enhance teaching and learning processes or sustainable development.

Keyword: Innovative, Technology, Teaching, Learning, Sustainable Development, Covid-19

Introduction

The spread of corona virus also known as Covid-19 has caused fear, anxiety and various concerns among citizens around the world. The corona virus has no boundaries and its effect is large and fast. The corona virus pandemic is novel, but it already has noxious effects on humanity. As at now, no nation or race across the world is immune from the corona virus pandemic and the entire world is overwhelmed by the speed of the spread and the devastating effects of covid-19. Various countries have taken preventive measures (such as isolation, use of face mask, use of sanitizer, etc.) In about 188 countries around the world, it is reported that the preventive measures taken to curb the spread of the virus, including closure of schools; from primary to university levels, has affected teaching and learning processes grossly. However, in order to promote the process teaching and learning during the pandemic, the use of technology has been considered the most appropriate (if not the only) alternative in many parts of the world, and Nigeria is no exception.

The introduction of technology in teaching and learning processes has improved teaching and learning outcomes. Using technological devices invented by technologists and to promote teaching and learning processes has helped to make our understanding, retention and application of knowledge easy and simple. It has helped to improve relationships between

educators and learners, reinvent our approaches to learning and collaborations, shrink long standing equity and accessibility gaps, and adapt teaching and learning experiences to meet the needs of both educators and learners. This paper therefore is an attempt to examine some of the innovative technological approaches for enhancing teaching and learning processes and its impact for sustainable and social development in a Post Covid-19 Nigeria. In order to achieve this goal, a conceptual analysis of such concepts like Teaching, Learning, Technological Innovations and Sustainable Development is given to strengthen the discussion.

Conceptual Clarification

In any philosophical discourse, it is pertinent to attempt by a gradual approach to clarify the key concepts of the topic under discussion, as some philosophers assume, philosophy is all about clarification of language. This paper therefore begins by explaining or clarifying the key terms of this study.

Concept of Teaching

Teaching means different things to different people. Teaching is one of the concepts in the family of education that is most loosely conceived. This indeed makes it difficult to know who is actually teaching and who is cheating. Teaching, as some people conceive it, involves merely giving information or drills to the learner. To those who consider teaching in this narrow sense, teaching is therefore aimed at making the learner memorize facts (knowing that only) and expecting the receiver to reproduce these facts later. The word teaching sometimes is always used as a means of punishment. For instance, an angry person may challenge that he will teach his opponent a lesson he will never forget in life. Furthermore, teaching is also used in place of training. There are so many other ways people use the word teaching, making the concept to lose its original meaning (Amaele, 2017).

Clark in Amaele (2017) define teaching as “activities that are designed and performed to produce change in student’s behavior. Smith in Amaele (2017) stated that “teaching is a process of interaction between teacher and students; a way of working with subjects matters of instruction, and a system of actions intended to produce learning. Akuezuilo (1989) posited that, teaching is “the guidance of pupils through planned activities so that they may acquire the richest learning possible from their experiences. For Akinpelu (1981), teaching can be looked at from three perspectives and they include:

1. Teaching as an occupation or profession (that is, talking of teaching as an occupation or as a profession)
2. Teaching as an enterprise (that is, referring to the normal activity of a teacher in classroom or school situation); and
3. The very act of teaching (that is, describing an actual teaching exercise presently going on).

Akinpelu (1981) expanded his definition of teaching as both a conscious and deliberate effort which the more experienced or matured person with the intention that the latter will learn or come to believe what is taught to him on good grounds. From the above definition, Amaele (2017) observed that there are four basic criteria that can be deduced and they include:

1. Teaching involves a competent person who is consciously and deliberately performing the act. The person (a teacher) is loaded with knowledge and experience.
2. Teaching also involves another who desires to be taught. He is less experienced and not so matured like the former (teacher), but desirous to learn.
3. Teaching requires some contents: these include information, skills, knowledge, values, attitude, norms, etc. that are being imparted

4. Teaching is intentional: the intention of any teaching is to bring about learning (change in behavior)

Concept of Learning

Learning is also one of the concepts in the family of education. Like other concepts in education, learning is confronted with various interpretation difficulties depending on the individual in question. It is a common concept used in all educational activities whether formal, informal, or non-formal education system. It entails many specific activities, such as learning by error, observation, discovery, listening, etc. (Oroka, 1990). Gbari (2012) opined that it is a concept that characterizes all learning outcomes. It can also be seen as a knowledge acquisition tool needed for grappling with the process of education that goes on in the school. Learning is a product of teaching. In other words, teaching is dependent on learning. The level of learning achieved could assess effective teaching. Akinpelu in Maina and Gyot (2018) suggests that the basic criteria for learning include:

- The learning can be done by living organisms and in the context of education only by human beings. That even where it may be argued that a computer has also learnt to do certain tasks or a robot has learnt to open doors or to actually perform certain tasks, we are at best using the word in a metaphorical sense because there are some criteria the computer or the robot cannot fulfill such as conscious or deliberate decision or refusal to learn
- Learning must involve the acquisition of some knowledge and skills. So for one to claim that he has learnt x, then there must be evidence that he has acquired some sort knowledge or skills related to x.
- For learning to take place, the knowledge or skills so acquired in the process of learning has to be new. So it does not amount to learning for a student who knows that $2 \times 2 = 4$ to say he is learning the multiplication table 2×2
- Learning must involve a conscious activity by the learner. This means that learning can only be done by the individual, not shared with him or done for him.

Concept of Technological innovations

Technological innovation is a part of the total innovation discipline. Thus, in order for us to have a good understanding of the concept 'technological innovation', it is pertinent for us to also have an understanding of the concept innovation. Innovation or 'innovare' which means to make something new leads to several conclusions of deeper meaning. It is quite cryptic and can be better understood when divided into three parts. To make something new one has to:

1. Generate or realize a new idea (invention and creativity)
2. Develop this idea into a reality or product (realization)
3. Implement and market this new idea (implementation)

Thus, technological innovation as a part of the total discipline focuses specifically on technology and how to embody it successfully in products, services and processes. Technology as a body of knowledge might thus be seen as a building block for technological innovation, serving as corner stone to research, design, development, manufacturing and marketing. Technological innovation means developing new ideas, products, services and processes which exploit technology (Audrey & Jaraji, 2016).

Technological innovation can be seen as a means to develop this solution into a viable and producible entity (Realization). It can also be seen as a means to successfully introduce and supply this entity to the real or perceived need (implementation). From the above definition one can conclude that technological innovation is a highly personal concept, relying heavily on knowledge, educational standards and intelligence.

Sustainable Development

Sustainable development refers to the overall development of a society with particular emphasis laid on the efficient use of natural, economic and social resources in a manner that preserves the environment thus allowing future inhabitants to benefit from progress made by the decisions of past inhabitants of a society. Emas (2015) in citing United Nations General Assembly (1987) defined sustainable development as the development that is expected to meet the needs of the present without compromising the ability for future generations to meet their own needs. Implicit in this definition is that development should “keep going” and seriously speaking, this is what sustainable development stands for. Furthermore, sustainable development emphasizes the creation of sustainable improvement in the quality of life of all people through increases in real per capita income, improvements in education, health and general quality of life and improvements in quality of natural environmental resources.

Sustainable development is development that is everlasting. It describes a process in which natural resource base is not allowed to deteriorate. Hence, the aim of sustainable development is to maintain economic advancement while protecting the long-term value of the environment. Other specific goals which aim at lifting living standards including bettering people’s health and education opportunities, giving everyone the chance to participate in public life, helping to ensure a clean environment and promoting inter-generational equity (Jhingan, 2005). It is important to note that the concept of sustainable development provides a global framework for optimal integration of economic and environmental policies with development strategies.

Innovative Technological Approaches for Enhancing Teaching and Learning

Technology is a key component of education in the 21st century. The increasing use of technology in education has modified teachers methods from the traditional approach that often place them as dispensers of knowledge to a more flexible approach where they act more as facilitators, mentors and motivators to inspire students to participate and learn (Onyema & Deborah, 2019). Technology facilitate remote learning, distance learning, virtual learning, blended learning, machine learning, ubiquitous learning, deep learning, as well as cooperative and collaborative learning. Most aspects of education is going digital and education stakeholders including students are confronted with the challenge of transition to online education. Onyema et al. (2020) observed that the use of appropriate technologies increases accessibility to learning resources such as massive open online courses and multiple learning approaches to meet the need of diverse learners. Some of the technological innovations causing changes in teaching and learning process as outlined by Fulton (2019) include:

Virtual Reality (VR): Virtual reality, augmented reality, and mixed reality technology is already the hottest thing in the tech world. One of the areas of application of VR technology is education. With VR, students can learn while interacting with a 3D world. One of the primary uses for this technology in the classroom is to take students on virtual field trips to places otherwise inaccessible.

Artificial Intelligence and Machine Learning: Artificial intelligence is being applied in all levels of technology, from the lowest to the most advanced levels. It is making its way into the educational sphere by means of automating grading and feedback and providing personalized learning opportunities. It is also used to enhance learning among students, especially those with special needs. Through machine learning, adaptive programs have been developed that care for the individual needs of students.

Cloud Technology: The cloud technology helps in ensuring educational resources can be accessed from any part of the world. It enables information to be stored, shared and accessed on any device that is connected to the internet. In education, the cloud is used to store digital

text books, lesson plans, videos and assignments. It has helped to eliminate the hassle of carrying tons of books or practically living at your local library because students can access these resources from the comfort of their homes.

3d Printing: 3D Printing is already seen as an impressive application in the world at large. In the classroom setting, 3D printing can create hands-on models that students investigate and interact with. Contents that were previously taught in via text books can now be expressed through 3D models. Through this printing technique, students can have a better understanding of something that was thought to be complex.

Innovative Technological Approaches for Enhancing Teaching and Learning towards Sustainable Development in Post-Covid 19 Nigeria

There can be no meaningful development if there is no proper teaching and learning. In other words, sustainable development is a general outcome of effective teaching and learning. This assertion is in line with the philosophy for sustainable development which was first defined in 1987 by Brundtland report of the World Commission on Environment and Development (WCED) as ‘meeting the needs of the present generation without compromising the needs of future generations’ (Jhingan, 2005; Olujimi, 2001; & Todaro & Smith, 2003). Teaching and learning for sustainable development is a concept or approach that integrates teaching and learning Processes into the theme of sustainability among which are: climate change and inclusive citizenship.

Teaching and learning for sustainable development literally covers the major educational concepts, steps and processes that facilitate whatever approach employed in achieving sustainable development. At the individual level, teaching and learning for sustainable development is geared towards strengthening individual competences to enable them contribute and participate effectively in developmental activities. These competencies are lifelong skills that include reading, writing, numeracy, creativity, solution oriented thinking and effective decision making.

At the collective level, it is aimed at enabling societies to inculcate sustainability in all socio-cultural and techno-economic activities. It is important to note that innovative technological approaches for enhancing teaching and learning towards sustainable development do not provide specific solutions to man’s problems related to sustainability challenges. It aims to enable children and adults make decision that ensures their survival and that of the future generation. Thus, the achievement of sustainable development is to a great extent, predicated on effective teaching and learning process.

Unfortunately, the Covid-19 pandemic has largely disrupted teaching and learning as most countries around the world had resorted to temporary closure of all educational institutions in an attempt to contain the spread of the pandemic. The ripple of the pandemic has been felt by both the educators and student in primary and secondary schools, as well as colleges and universities, as academic sessions were disrupted during and after the Covid-19 due to public health emergency (Adeoye et al., 2020). This effect is also evident in the Nigerian education sector as academic sessions were halted by the federal ministry of education so as to curtail the spread of the virus in educational institutions. Although, this decision came as a shock to many of those who were not prepared for the sudden disruption, others had seen it as a step in the right direction.

However, the Covid-19 pandemic has shaped a new normal for the education sector across the globe. It has opened up the importance of technological innovations in teaching and learning process because in order to promote teaching and learning during the pandemic, the use of technology had been considered the most appropriate (if not the only) alternative to keep teaching and learning processes in many part of the world, and Nigeria is not exempted.

Despite the difficulties and challenges posed by integrating and embracing technological innovations in teaching and learning process, it had become the most effective alternative to keep teaching and learning process functional during the period, especially when movement was restricted and institutes of learning were on lockdown.

The use of technology in teaching and learning has helped in enhancing the efficiency of knowledge as both students and lecturers now have easy access to a large amount of information within the global village. The use of technology in learning process has enabled learning to become more open and teaching methodologies to become more flexible, thus, making student more independent and self-determined, becoming responsible for learning (Goode et al., 2007), gaining self regulating activities in relation to goal setting, and becoming self-monitoring and gaining self-regulating abilities in relation to goal setting, and becoming self-monitoring and adaptable. Such opportunities also allow teachers to promote active learning so that learning is engaging and effective (Collis, 1998), which makes them facilitators of the learning process (Huang et al., 2020) and exempt them from the responsibilities of teaching alone by giving students responsibilities as well (Goode, 2007). Moreover, with the development of technology, the student-centered approach is considered the main component of flexible learning, as it empowers students and teachers to share information with each other (Lundin, 1999).

The innovative adoption of technology in teaching and learning has helped to reduce issues of insufficient classrooms, as students can easily take their lectures online without any disruption and at their convenience. It has helped to exposed both lecturers and students to the reality of the world outside the classroom since the world is a global web. Arkorful and Abaidoo (2014) also posit that the cost benefit of adopting technology in training students is lesser than that of physical (face to face) contact because it reduces travel time and infrastructural development in terms of buildings. Hence, it increases satisfaction and decreases stress.

Conclusion

The critical reflection presented above exposes the fact that the adverse effect of the corona virus pandemic which led to the disruption of human activities globally including educational activities, research, sports, entertainment, transportation, worship, social gathering/interactions, economy, business, politics, and global health has shaped a new normal for teaching and learning processes for sustainable development in Nigeria as many educational institution in the country are beginning to embrace the use of technology as an alternative to face-face contact learning thereby helping institutions to cover gaps which the pandemic must have created in the calendar of institutions. The unprecedented school closure due to corona virus remains a lesson and a warning to educational institutions in Nigeria especially those who are yet to embrace and adopt the use of technologies in the teaching and learning processes.

Recommendations

The paper therefore offers the following recommendations:

5. The integration and adoption of technology in our educational institutions is no longer a choice, but a need to enhance teaching and learning processes for sustainable development.
- 1 Workshops and seminars should be organize periodically to intimate both teachers and students on the relevance of innovative technological approaches for enhancing teaching and learning towards sustainable development.

- 2 Government should improve its budgetary allocation for Education sector so as to attract external educational financing to compliment domestic funding and ensure increase in use of technological innovations in teaching and learning processes for the realization of sustainable development.

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