

## **Virtual Teaching and Learning: The Sustainable Tools in Digitalization of Education**

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### **Abstract**

*Virtual teaching and learning have been part of the integration of the use of technological tools in this digital age and new normal. The formation of a knowledge society and the digital storage of development of modern civilization culture still remain a continuous process in the era of virtual teaching and learning within the education system especially during this global pandemic lockdown. This article reviews the use of virtual teaching and learning as techniques to improve digitalization in the use of new e-tools in teaching and learning in Nigeria. To achieve this, the concept of virtual teaching and learning is reviewed with the intention of looking at its features in digital education. The benefits of virtual teaching and learning are many which include opportunity for timely and distance education, better interactions, easily accessible to learners; the lesson can be easily tracked and recorded. It was concluded that virtual teaching and learning had great significant impacts on digital education and proved to be a vital and sustainable tool in digitalization of education. This paper recommends that the government of Nigeria should improve on adequate provision of infrastructures which will aid the use of virtual teaching and learning at all levels of education system.*

**Keywords:** *Virtual Teaching, Learning, Digitalization and Sustainable Tools.*

### **Introduction**

Presently, the world lives in information communication technology age and many people especially students in higher education and their teachers depend on computer to carry out various responsibilities. Virtually all higher educational institutions are aware that the use of network technology can create, foster, deliver, and facilitate learning, and enhance both teachers and students experience and knowledge (Li, Qi, Wang and Wang 2014). The rapid developments and growth of information and communication technology have had a profound influence on higher education, this is called e-learning, which means that teachers and students perform teaching and learning task through internet, a way different with traditional classroom. Higher education systems all over the world are challenged nowadays by the new information and communication technologies (ICT) and new normal that arises from COVID-19. These technologies have had a huge impact on the world economy, corporate management and globalization trends, and they bear a tremendous potential to reshape the nature of

study environments everywhere, of both conventional and online teaching institutions.

Online teaching and learning are the newest and most popular form of virtual education today. Within the past decade it has had a major impact on postsecondary education and the trend is only increasing. Online learning is education that takes place over the Internet. It is often referred to as “e-learning” among other terms. According to Sufeng and Runjuan (2013) Virtual classroom refers to courses offered through the internet. It is a teaching and learning environment located within a computer mediated communication system. It consists of a set of group communication and work spaces and facilities that can surpass that of the traditional classroom, a process in which students and teachers are actively involved in creating and carrying out learning activities together like group discussion, joint projects, and debates, sharing of solutions to homework problems by emails, bulletin boards, chat rooms and conferences. The development of technology and the internet is the basis of virtual teaching and learning. Furthermore, Sufeng and Runjuan (2013) stated that the virtual teaching

and learning possesses some of the characteristics of the internet which is what the traditional classroom does not have. For example, there is no limit of time, place, distance, and it is more convenient for both the students and the teachers to get more information from the internet. This seems to be the hope for both teachers and learners so as to overcome all the problems existing in the traditional classroom and many people even are trying to use as much as virtual technology as possible in the real campus. The differences between virtual classroom and the traditional classroom have been ignored.

As the coronavirus spread increases, schools are working hard to respond to potential health-care crises, schools are closings, and other issues that are arising on a daily basis. The question is how can institutions continue to offer instructions if they decide to close or to cancel traditional face-to-face mode of teaching? A growing number of schools are moving their classes online as a short-term solution. Many teachers have never taught online and also, technical support is often lacking. Also, question as whether an online-only model would penalize students who may not have access to digital tools or the internet. Still, many institutions are looking to online learning as a way to salvage students' education in the wake of the pandemic and they believe that we will have to live with it for some time is very alarming. A lot of thing must first of all be put in place before virtual teaching and learning coming in place. The first thing is that everybody is presumed to have access to internet and broadband especially those in less cities or rural areas. In addition to this is the technical support from the institutions. Are the institutions ready to support teachers moving from face-to-face teaching and learning to virtual?

In Nigeria, public institutions are still lacking behind in terms of supporting their staff technically and readiness to move to online for virtual teaching and learning. This is very important in sustaining digitalization of education now that we are the era of new normal. It is on this basis that this study looked into virtual teaching and learning as sustainable tools for digital education in Nigeria.

## Virtual Teaching and Learning

There are various views and opinions about virtual teaching and learning but all points to the use of internet, computers etc. Some of the definitions of virtual teaching and learning include: Virtual Teaching and Learning is an e-learning concept whose definition and prime objective is to enable the teachers and the students to impart and perceive education online, principally over the Internet. It also allows teachers and students to communicate, interact and, work together with one another remotely from any location, without actually being physically present face-to-face, though, You Tube, Facebook, Zoom, Free Conference, Webinars, Audio and Video conferences, Web Presentations, Live streaming, Text chats, Learning Management System (LMS) and online training courses ([www.edusys.co](http://www.edusys.co), 2020).

Another definition refers virtual teaching and learning system is an online system that allows education materials to be transmitted through the internet and transfer knowledge from organization to employee, or teacher to student. Various examples of virtual teaching and learning include but not limited to Degree Programme, video or audio lecture, webinar etc.

Furthermore, Beek, (2011) stated that virtual learning uses computer software, the Internet or both to deliver instruction to students. This minimizes or eliminates the need for teachers and students to share a classroom. Virtual teaching is a place where teachers are facilitators and students are actively engaged and interacting with one another, this is a place where students are comfortable and safe and still to learn. Teachers make use of all available means of online teaching to teach the students, also make sure that the classroom interactive. In the classroom, there should be teacher-student interaction, student-teacher interaction and student-student interaction. Virtual learning does not include the increasing use of e-mail or online forums to help teachers better communicate with students and parents about coursework and student progress; as helpful as these learning management systems are, they do not change how students are taught.

Beck (2011) enumerated several forms of Virtual learning to include:

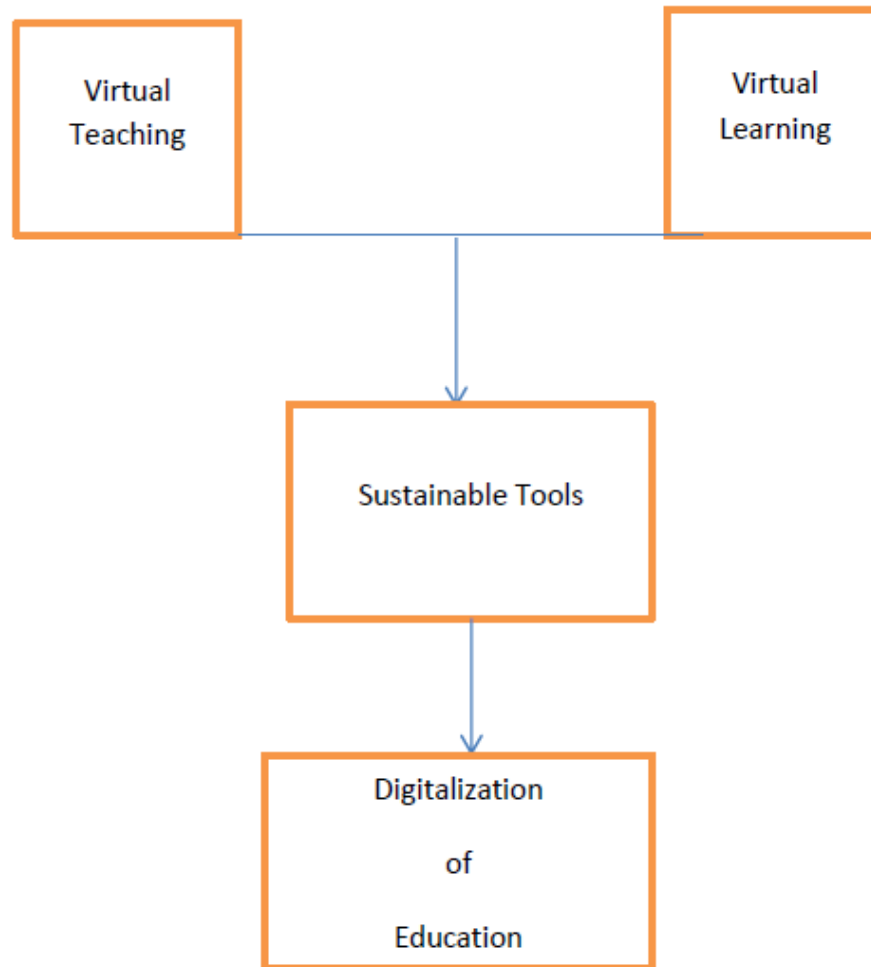
- i. *Computer-Based*: Instruction is not provided by a teacher; instead, instruction is provided

by software installed on a local computer or server. This software can frequently customize the material to suit the specific needs of each student.

- ii. *Internet-Based*: This is similar to *computer-based* instruction, but in this case, the software that provides the instruction is delivered through the Web and stored on a remote server.
- iii. *Remote Teacher Online*: Instruction is provided by a teacher, but that teacher is not physically present with the student. Instead, the teacher interacts with the student via the Internet, through such media as online video, online forums, e-mail and instant messaging.
- iv. *Blended Learning*: This combines traditional face-to-face instruction, directed by a teacher, with *computer-based*, *Internet-based* or *remote teacher online* instruction. In effect, instruction comes from two sources: a traditional classroom teacher, and at least one of the forms of virtual learning described above.
- v. *Facilitated Virtual Learning*: This is *computer-based*, *Internet-based* or *remote teacher online* instruction that is

supplemented by a human “facilitator.” This facilitator does not direct the student’s instruction, but rather assists the student’s learning process by providing tutoring or additional supervision. The facilitator may be present with the learner or communicating remotely via the Web or other forms of electronic communication.

- vi. Similar forms of virtual learning are sometimes grouped into broader categories (Beek, 2011):
- vii. *Online Learning*: This is any form of instruction that takes place over the Internet. It includes *Internet-based* instruction; *remote teacher online* instruction; and *blended learning* and *facilitated virtual learning* that involves these two virtual learning methods. It excludes *computer-based* learning.
- viii. *Full-Time Online*: This is online learning with no regular face-to-face instruction or facilitation. It is *Internet-based* and *remote teacher online* learning only, though it may include some occasional interaction with human teachers and facilitators.



**Figure 1.** Conceptual Framework of Virtual Teaching and Learning for Sustainability

### Components of Virtual Learning

Some positive features of virtual teaching and learning include being mobile accessible and self-spaced which are more convenient within any location. Its content came in variety of modalities such as:

**E-learning Video:** teacher recording the teaching on videos and send to students to watch. Students can watch repeatedly for better understanding.

**Animated Course Content:** It is the use of art and technology to bring images to life, by implementing design and computer software. Animation is the technique of using successive drawings or other art to simulate movement.

**Interactive Game:** interactive is action and communication between two people or two things, such as two-way communication. An example of an interactive game is one in which you communicate with the game and the game gives feedback back based on what you said or did.

**Online Activities:** Online interaction by end-users with other end-users, this includes the sharing of user content within the gameplay or online environment of Licensed Products with online elements such as PlayStation Home, the virtual, interactive community of PSN etc.

**Online Instructor:** These are school teachers who teach classes over the internet. They share many of the same duties as a traditional in-person instructor, but connect to their students through email, message boards, video chatting, and other online communications tools.

Many online teaching positions are being filled by part-time instructors. Many colleges and universities have found that this helps to reduce some administration of benefits and pay.

### Digital Education Tools for Teaching and Learning

Many digital education tools have been created with the purpose of giving autonomy to the student, improving the administration of

academic processes, encouraging collaboration, and facilitating communication between teachers and learners. According to Chauhan (2018), digital education tools include the following:

**Edmodo:** is an educational tool that connects both the teachers and students, and is assimilated into a social network. Teachers can create online collaborative groups, administer and provide educational materials, measure student performance, and communicate with parents, among other functions. Edmodo has users who connect to create a learning process that is more enriching, personalized, and aligned with the opportunities brought by technology and the digital environment.

**Socrative:** designed by a group of entrepreneurs and engineers passionate about education, it is a system that allows teachers to create exercises or educational games which students can solve using mobile devices, it can be smartphones, laptops, or tablets. Teachers can see the results of the activities and use it to modify the subsequent lessons in order to make them more personal.

**Project:** is a tool that users you to create multimedia presentations, with dynamic slides in which interactive maps, links, online quizzes can be embedded in it. Also, Twitter timelines, and videos, among others. During a class session, teachers can share with students' academic presentations which are visually adapted to different devices.

**Thinglink:** allows educators to create interactive images with music, sounds, texts, and photographs. These can be shared on other websites or on social networks, such as Twitter and Facebook. Thinglink offers the possibility for teachers to create learning methodologies that awaken the curiosity of students through interactive content that can expand their knowledge.

**TED-Ed:** is a platform that allows creating educational lessons with the collaboration of teachers, students, animators, generally people who want to expand knowledge and good ideas. This allows democratizing access to information, both for teachers and students. On this platform, people can have active participation in the learning process of others.

**cK-12:** it seeks to reduce the cost of academic books for the K12 market in the United States and the world. To achieve its objective, the platform has an open source

interface that allows creating and distributing educational material through the internet, which can be modified. It contains videos, audios, and interactive exercises. It can also be printed and comply with the necessary editorial standards in each region. The books that are created in cK-12 can be adapted to the needs of any teacher or student.

**ClassDoj:** is a tool to improve student behaviour. Here, teachers provide their students with instant feedback so that good disposition in class is 'rewarded' with points and students have a more receptive attitude towards the learning process. ClassDojo provides real-time notifications to students, like 'Well Done David!' and '+1', for working collaboratively. The information that is collected about student behaviour can be shared later with parents and administrators through the web.

**eduClipper:** this allows teachers and students to share and explore references and educational material. You can collect information found on the internet and then share it with the members of previously created groups, which offers the possibility to manage more effectively the academic content found online. This improves research techniques, and has a digital record of what students achieved during the course. Furthermore, it provides the opportunity for teachers to organize a virtual class with their students and create a portfolio where all the work carried out is saved.

**Storybird:** aims to promote writing and reading skills in students through storytelling. Using this tool, teachers can create interactive and artistic books online through a simple and easy to use interface. The stories created can be embedded in blogs, sent by email, and printed, among other options. With Storybird, teachers can also create projects with students, give constant feedback, and organize classes and grades.

**Animoto:** is a digital tool that allows you to create high-quality videos in a short time and from any mobile device, inspiring students and helping improve academic lessons. The Animoto interface is friendly and practical, allowing teachers to create audiovisual content that adapts to educational needs.

**Kahoot!:** is an educational platform that is based on games and questions. Through this tool, teachers can create questionnaires, discussions, or surveys that complement

academic lessons. The material is projected in the classroom and questions are answered by students while playing and learning at the same time. Kahoot! promotes game-based learning, which increases student's engagement, also, creates a dynamic, social, and fun educational environment.

### **Importance of Virtual Teaching and Learning**

The emergence of virtual teaching and learning as a result of the new normal has been faced with some challenges. In spite of these issues, its advantages are numerous. They include:

- i. It is more open: This is one of the biggest advantages of virtual teaching and learning. Students can register a course without the limitation of time, place, age and other factors. Student can learn in the morning, afternoon, or at night. You can work while you attending the virtual classroom and learn whatever you like. It is cheaper. You can save boarding fees, cost to travel to-and-from the campus.
- ii. A good way to develop students self-learning ability: The students in virtual teaching and learning have to learn how to begin their learning, how fast they can go and how to solve some of the problems by themselves. These are really helpful to develop their learning ability. And the students become the main body of learning process. They can learn faster if they can. It is good for individual development. And if they foster the self-learning ability in the virtual classroom, they will benefit from it for all their life.
- iii. Enhanced Learning: Research shows increased depth of understanding and retention of course content; more meaningful discussions; emphasis on writing skills, technology skills, and life skills like time management, independence, and self-discipline.
- iv. Innovative Teaching: Student-centered approaches; increased variety and creativity of learning activities; address different learning styles; changes and improvements can translate to on-ground courses as well.
- v. According to Jason (2001), students view the use of the virtual teaching and learning as an ease of accessibility. It is much easier with the information posted on the Web because it is available 24 hours a day. Distance learning courses can be done anywhere and at any time. Students can view this information without having to contact the instructor.
- vi. Of the educational advantages of the virtual teaching and learning, the notion of distance acting as an actual aid to the teaching and learning is central and perhaps surprising. Instead of the technology solely acting as a barrier, it simultaneously seemed to force the users to be pragmatic in their actions and alter their behavior accordingly. Teachers and pupils who normally had difficulties in controlling their teaching and studying acts gradually found that the new learning environment required them to develop novel ways of teaching and learning. They found that they patiently had to wait their turn, speak more clearly, moderate their accents and plan more carefully what they were going to present. Both teachers and pupils had to adapt to the mediated interactions that required everyone to present their points quickly, precisely and audibly for the benefit of everyone and not just for the local classroom (Husu, 2000).
- vii. Another educational advantage lies in the intellectual and social partnership created by technology of the virtual classroom. Pupils using the equipment engaged additional social skills when they spontaneously took leadership roles in relation to other pupils (Husu, 2000). The technology used increased group cohesion and mutual support especially in the remote classroom. Its suitability for small-group work and its interactive mode both contributed to the development of skills using information and communication technologies.
- viii. Communication is considered a benefit because most contact with instructors will be done via email, messages can be sent at any time day or night. To the teacher the fact of everything being digital is an advantage. Since all work is sent over e-mail, instructions are able to deal with students work in an easy manner. Since everything is typed the teacher no longer is faced with the challenge of deciphering handwriting.

## **Challenges of Virtual Teaching and Learning**

One of the issues facing teaching and learning is epileptic power supply in Nigeria is a great challenge to virtual teaching and learning. There is hardly supply of electricity for 12 hours a day. Most students cannot afford generating set. With this virtual teaching and learning becomes a problem. Also, cost of purchasing data for online teaching and learning is expensive. This can discourage the students as most of the students are not working. They still depend on their parents to purchase data for them. Unstable network connectivity also posed a great challenge to virtual teaching and learning in Nigeria. For example, if a student is online taking a course and there is network failure, such student will not be able to continue with the class or later get discouraged if the network connectivity is not stable. Another persistent problem has been the factor of time. Teachers have expressed their displeasure about not having too much demand on their time. The use of the Internet causes many teachers to step out of their comfort zones because; Internet teaching goes against the traditional method of teaching. In order to capitalize on the benefits of the internet, teachers must first structure their material to fit the layout of the internet. This process does not happen overnight, it requires time, dedication, and some patience. They are required to adjust their curriculum to meet the standard requirement for providing the right resources for the users (students). It can require more time than teachers want exert or afford to give up. One teacher stated "It is like having unlimited office hours." (Tinker 1998). Traditionally, teachers have the flexibility of making their own office hours to fit their schedule. Online courses cause teachers to be on call twenty-four hours a day because students expect a prompt response or feedback when they send email.

Furthermore, time related issue deals with training. Training is obligatory especially to teachers who are not comfortable with computers or the internet. In order for the college to be represented professionally, teachers must undergo training. The more familiar the teachers are with the online service, the more effective and efficient their curriculum will be. Adapting non-online course to online courses can be arduous or challenging. Although

many classes have performed well with the online course, there are other courses that has not. For example, the laboratory portion of a science class. Laboratory classes require a great amount of hands-on work. Online courses cannot offer the hands-on experience that an in-class lab could offer. This is not to say that some of the laboratory exercises can be done by the computer, because it can. However, internet cannot duplicate the hands-on approach students experience with an in-class lab (Brown 2001).

The lack of face-to-face interactions with other peers and the instructor can be a disadvantage for the students and professors. For instance, some students desire the immediate feedback from the professor, which they do not get online. When in class a simple homework problem can be resolved one-on-one easily with the professor, however online that option is not available. Mail and bulletin boards can also cause confusion to Internet learners. Some students often create the problem because they do not read emails and class bulletins. An abundance of emails can cause students to get behind in their course work. Internet students are put at a disadvantage when it comes to networking and forming new relationships. Students can get to know each other over the net however it does not replace the bond that is formed from face-to-face meetings. Ambiguous instructions are also a fallacy of internet-based learning. These issues are often easier to resolve in person rather than over the Internet. Procrastination is another problem that occurs with Internet based learning because the individual is not forced to stick with a set schedule. Therefore, a routine is often not developed and work is not completed in a timely manner. (Hiltz, 1997). Online learning poses new challenges for teachers. In some cases, achieving student success can be as simple as preventing student withdrawals from distance learning courses. Distance learning gives teachers the opportunity to teach their students both course content and how to become lifelong learners.

## **Importance of Virtual Teaching and Learning on Education**

The use of technology as a productivity tool has a much longer history in business than in education. Online learning is often suggested as a means for improving educational outcomes,

expanding access at lower costs than conventional approaches or allowing talented teachers to focus on what they do best by automating or offloading more routine tasks (Christensen and Horn 2008; Christensen, Johnson, and Horn 2008; Moe and Chubb 2009; Olster 2010; Wilson 2010; Wise and Rothman 2010). A review of the literature was conducted to gather empirical research that provides evidence of actual productivity impacts when online learning is compared with place-based instruction in secondary schools. However, the available research base was found to be lacking because studies did not adopt rigorous methodologies or did not provide comparable information about alternatives. Given the limitations of the research specifically regarding the costs and effects of online instruction for secondary students, the review that follows also draws on examples and research about the use of online learning for postsecondary instruction.

A review of this extended literature base suggests nine different pathways through which online learning might contribute to improved productivity. These nine pathways are not necessarily mutually exclusive. They are illustrated here through examples in order to demonstrate the kinds of tools and trade-offs needed to realize productivity gains. Five address improving educational access and effectiveness, while four relate more directly to potential cost reductions.

- 1) **Broadening access** in ways that dramatically reduce the cost of providing access to quality educational resources and experiences, particularly for students in remote locations or other situations where challenges such as low student enrollments make the traditional school model impractical;
- 2) **Engaging students in active learning** with instructional materials and access to a wealth of resources that can facilitate the adoption of research-based principles and best practices from the learning sciences, an application that might improve student outcomes without substantially increasing costs;
- 3) **Individualizing and differentiating instruction** based on student performance on diagnostic assessments and preferred pace of learning, thereby improving the

efficiency with which students move through a learning progression;

- 4) **Personalizing learning** by building on student interests, which can result in increased student motivation, time on task and ultimately better learning outcomes;
- 5) **Making better use of teacher and student time** by automating routine tasks and enabling teacher time to focus on high-value activities;
- 6) **Increasing the rate of student learning** by increasing motivation and helping students grasp concepts and demonstrate competency more efficiently;
- 7) **Reducing school-based facilities costs** by leveraging home and community spaces in addition to traditional school buildings;
- 8) **Reducing salary costs** by transferring some educational activities to computers, by increasing teacher-student ratios or by otherwise redesigning processes that allow for more effective use of teacher time; and
- 9) **Realizing opportunities for economies of scale** through reuse of materials and their large-scale distribution.

## Conclusion

Virtual teaching and learning are becoming increasingly prominent in tertiary institutions. From this research it will be concluded that:

In this era of digitalization, the scope of virtual teaching and learning has increased, and is beneficial to students, teachers, professionals and also institution

Virtual teaching and learning have brought a positive impact in the lives of students and teachers. It has given an opportunity to take up additional courses along with their studies.

Online teaching and learning have helped the to ask students to study some part of syllabus online which do not require much of classroom instruction.

More comfortable than normal classroom teaching.

The quality of education has improved by online courses and even it has become easy for students to refer the content as per their leisure.

## Recommendations

The following recommendations are hereby made:

- There should be stability of power supply



- Cost of purchasing data should be reduced drastically
- Network providers should improve on the quality of services to the citizens
- Education providers to provide feedback. Giving students frequent written and verbal feedback encourages efforts and positive habits
- Policy makers should promote formative and summative valuation of the students.

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