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Prospects and Challenges of E-Learning and Computing In Distance Education.

By

HAPPINESS OKWUDIRI EZIAGHIGHALA
Department Of Curriculum and Instruction,
Alvan Ikoku Federal College of Education, Owerri,
Imo State.

RACHEAL UKACHI URENYERE, Ph.D
Department Of Curriculum and Instruction,
Alvan Ikoku Federal College of Education, Owerri,
Imo State.

And

VERONICA NKECHINYERE UKWUOMA, Ph.D
Government Technical College, Owerri,
Imo State.

Abstract

The era of digitalization is greatly influencing the process of teaching and learning. This is largely essential in the distance education programme. Distance education has in recent time proffered solutions to effective lesson delivery to myriads of students in various locations. This need is fortunately being addressed by the emergence of cloud computing and e-learning otherwise known as cloud based e-learning. Cloud computing has the potential to transform the way distance education is organized along with internet resources. This paper examines the concept of e- learning, distance education, cloud computing and the platforms. The benefits of cloud based e-learning include among other things ensuring security of data, some challenges of this new technological approach to distance education were mentioned. Recommendations were also made which include provision of steady power supply, reduction in costs and ensuring security of data.

Keywords: E-learning, distance education, cloud, cloud computing and its platforms.

In recent years and in our world today, the internet has become a place that enables users to access environmental education as well as the implementation of software applications. This development is spreading very fast as digital technologies are not only creating new opportunities for our society but advancing several challenges as well. Today e-learning and cloud computing are emerging technologies and innovations which are growing very fast.

E-learning relates to the use of electronic mechanisms to support the learning process. It is learning utilizing electronic technologies such as computers to access educational curriculum outside the classroom. It is an internet based learning process which facilitates and extend learning which will not replace traditional educational methods but will greatly improve the efficiency of higher educations. E-learning motivates the learner in his/her learning process to the advantage of anytime, anywhere usage. It also gives the learner opportunities to work at his own pace with such electronic gadgets as smart phones, tablets etc. Cloud computing is a model for enabling convenient, on-demand network access to shared pool of configurable computing resources (e.g. network, servers, storage, applications and services) which can be rapidly provisioned and released with minimal management effort on service provider interaction (Mell& Grance, 2009). Cloud computing describes a new supplement, consumption and delivery model for information technology service, that is based on the internet. It presents itself as an on-demand computing with which users are allowed to have access to data, applications and services anywhere.

Distance education is the modest and effective way of realizing the anytime, anyplace education. The learners choose to learn at a distance or in person at the traditional campus. In other words the teaching and learning process could be synchronous where the learner and the trainee interact with each other in real time or it could be asynchronous learning where the learner does not interact with the trainer in real time as trainers rely on delayed feedback. The number of learners who are trained through distance education has increased tremendously. The power of e- learning and virtual collaboration is growing fast in education and in the worldwide economy. This power will be best realized with a well-planned cloud computing and e-learning strategy integrated into distance education.

The Concept of E-Learning

E-learning as a concept can be defined as a teaching and learning environment constructed in software, which supports collaborative learning among students who participate at times and places of their choice through computer networks (Aremu, Jacob and Ogedebe (2013). Continuing Aremu, Jacob and Ogedebe (2013) posit that e-learning can be defined also as an innovative approach for delivering electronically mediated, well designed, learner- centered and interactive learning environments to anyone, at any place and anytime by utilizing the internet and digital technologies.

For Riahi (2015) e- learning is an internet- based learning process which uses internet technology to design, implement, manage, support and extend learning which will greatly improve the efficiency of education. E-learning has a lot of advantages such as flexibility, diversity, measurement, opening etc. It is broadly used in different educational stages in today's world. Such stages, include development in higher education, continuous education, education through the internet, on line problem solving, virtual classrooms and digital collaboration where content is delivered via internet, intranet /extranet, audio tape, satellite T.V. (Riahi, 2015). Lending weight to the concept of e- learning, Masuch, Anwar and Huang 2012) stated that popular e-learning technologies include:

- Content-delivered via the internet, audio, satellite, television.
- Voice- centered technology such as CDs/DVDs or web casts.
- Video technology such as instructional videos, DVDs and interactive video conferencing.
- Computer-centered technology: This is delivered over the internet or corporate internet.

Examples of Cloud E- learning Approaches.

Various e- learning facilities exist. This includes those from open sources to those ones that are commercially based mainly for educators and apprentices.According to Sudhir, Nidhi and Monisha (2014), they include the following:

- **Book marking**: - This feature gives the user the advantage to go back to a previously visited website by clicking on the saved link without retyping the site's address. With the advancement of technology, e-learning can be beneficial to the users in the comfort of their homes. There is also the willingness of the learners to start the course according to their timeline with preference to their jobs at their disposal.
- **Search**: - The technology helps the e-learner user to search the particular information required to complete a task while on the move.
- **Multimedia**: - This refers to a combination of a variety of format such as texts, graphics, animation, audio and video used to enhance the online learning process which helps the e-learner users to grasp the pedagogy and concept maps associated with the technical concepts of the educational materials.
- **Interactivityskills**: - This is an instructional strategy that helps a learner practice what they have learnt and implement them in their behavioural interaction.
- **Notes and Highlights**: - The smart users mark and save their own interesting topics of a course which contain the most important information on the webs for a longer usage. This facility is available on all gadgets such as tablets, smart phones, PDA's and many more.
- **Online experts**: - In the course of assessing the internet, the e-learner can easily access the subjects through chat or online discussion on a particular topic on their internet.

❖ **Computer-based training:** - This provides the delivery of training or education through electronic media such as internet, CD/DVDs etc. It also provides learning management system through software such as web courses that help educators and smart users in their knowledge base.

What Is Cloud Computing?

Cloud may refer to any mobile or visible gathering of objects, particles or gases in the atmosphere. Cloud may also describe an unclear situation or phenomenon. In recent times the term cloud has found new expressions in computer and acceptance in education through technology (Inyang-Abia).

Cloud computing refers to a collection of servers delivering resources that can be accessed remotely through the internet in real time. As posited by Inyang-Abia (2015), cloud computing describes an internet-based activity where groups of remote servers are networked to allow centralized data storage and online access to computer resources and services. Being an Information Technology (IT) expression, it means processing data over a large network with emphasis on software, platform and infrastructure as services.

As noted by Aremu, Babatunde and Ogedegbe (2015), the concept of cloud computing refers to the delivery of computing resources over the internet. Instead of keeping data on your own hard drive or updating application for your needs, you use a service over the internet at another location to store your information or use its application. Lending weight to the definition of cloud computing, Ofondu (2010) opined that cloud computing is a technology that delivers powerful computing resources through the web. As an innovation in educational sectors cloud computing aims at providing an all-encompassing insight into the modern ways of learning and teaching. It is a set of hardware and network resources set to deliver different kinds of services through the web.

In his own view Awosan (2014) citing United States National Institute of Standards and Technology (USNIST) (2011) stated that: I quote,

Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage applications and services) that can be rapidly provisioned and released with minimal management effort or server provider interaction (p.34).

Cloud computing uses applications as a broad set of different services cut across. These include-:

i. E-mail services such as gmail or yahoo
ii. Online data storage solution such as drop box or box
iii. Other kinds of applications accessible online.

Cloud computing options

Cloud computing options include three delivery modes as posited by (Mell and Grance, 2009). They include the following;

i. Software as a service (Saas)
ii. Platform as a service (Paas)
iii. Infrastructure as a service (Iaas)

These services are arranged in layers and they represent the traditional "in premises" computing system.

Software as a service

According to Awosan (2014), this is the topmost and easiest layer of cloud computing. This refers to any type of software programme that is managed remotely and delivered through the web. Inyang-Abia (2014) pointed out that software as a service (saas) enables the client /customer to use the internet service provider's (ISP's) application in the cloud infrastructure from their device through an interface such as a modem or router. The consumer uses an application but does not control the operating system, hardware or network infrastructure on which the software is running. Salesforce.com, Google apps, Microsoft, Zoho are examples of saas.

Platform as a service (Paas)

This is the middle layer of cloud computing. It consists of operating systems, hardware and network application development platform which can be accessed and utilized through the internet (Awosen, 2014). The consumer uses a hosting environment for his/her application and controls the applications that run in the environment (possibly with some control over) the hosting environment. The consumer does not control the operating system, the hardware or the network infrastructure on which the applications are running. Developers use this platform to develop, test, deploy and host web applications as a service through the internet. Examples include Microsoft Azure and Microsoft windows.

Infrastructure as a platform

This is the bottom layer. It is basically what software applications run on and where data is stored. (Barnat, 2010). The consumer uses fundamental computing services such as processing power, storage, networking components or middle wave. The consumer can control the operating system storage, deployed applications and possibly networking such as firewalls and load balancers, but not the cloud infrastructure beneath them. Examples include Amazon web service (AWS) and Backspace cloud server.

Cloud computing development models

Cloud (computing) services can be deployed through four models (Wu, cernusa and Abdous 2014).

i. **Public cloud**: In simple terms public cloud services are characterized as being available to the general public or to large industry groups from a third party service provider through the internet. Some of the applications are made available free while others are accessed on a pay-as-you-go- service. Third party companies such as google, Amazon. Microsoft and others run public clouds. A public cloud does not mean that a user's data is publically visible. Public cloud vendors typically provide an access control mechanism for their users.

ii. **Private cloud: -** Private cloud services offer cloud computing on private networks. Private clouds are typically designed and managed by an IT department within an organization or by a third party. In a private cloud based service, data are processed and managed within the organization with the restrictions of network bandwidth or security exposures or without the legal requirements that using the public cloud services might entail.

iii. **Community cloud:**- Community cloud refers to when the cloud is exclusively provisioned and used by a particular community of consumers that have concerns such as mission, security requirements, policy and/or compliance considerations. It may be managed by the organization by a third party and it may exist either on-premises or off-premises.

iv. **Hybrid cloud:** - This is a combination of a public, private and /or community cloud that inter-operate. In this model, users typically outsource non –business critical information and processing to the public cloud while keeping business critical services and data in the private cloud.

Cloud computing has certainly affected the field of education especially in the developed countries. It has made a profound and remarkable impact on the quality and quantity of teaching , learning and research especially in distance education

Suitability of cloud computing for e-learning in distance education

As posited by Muhammad and Abdulrahman (2015) cloud based e-learning is suitable for distance education for the under listed points-:

- **Ease of access:-** Learners can easily access educational resources or enroll on training without being physically available at the training centre.
- **Group based collaboration:** - Learners can interact among themselves to brain storm and share ideas. This can lead to improved teacher-learner communication.
- **Flexibility:** - Learners can freely join discussions on the bulletin boards or chat rooms or threaded discussion areas at any hour. Learners can also visit classroom and instructors remotely in chat rooms.
- **Self-paced learning modules-:** This allows learners to study at their own pace, learning new skills and able to develop their own learning curves

- **Universal dimensions of knowledge: -** Learners are enabled to search for and find unlimited information as required. They are also to get data using ICT-enabled tools.
- Improved response to meeting up deadlines for homework submissions compared to the traditional learning approach. Learners can easily access anytasks given and work fast on them.

Contributing to the suitability of cloud computing for e-learning Aremu, Jacob and Ogedebe (2013) also noted that cloud based e-learning can be seen as education software as a service. They emphasized that the deployment of the system can be done very fast with minimum cost. The burden of maintenance and support from the universities to the vendors is also less. This allows for focus on the core business of learning, teaching and research. Citing Zhu (2011), Aremu, Jacob and Ogedebe (2013: 2000-2001) outlined the implications of the development of E-learning services in cloud computing environment as follows:

- **Access through web: -** This implies the ease of access from anywhere and at any time. One can also have access of any of the applications. This makes for greater demand for web development skills.
- **No client-side software needed: -** These reduces the costs for the subscriber as no installation, software maintenance deployment and server costs are made. There is lower cost of ownership and reduced time –to-value. In the same vein fewer IT staff is needed by the institution and lot of fund is thereby saved.
- **Payment by subscription based on usage: -** This is suitable for software model education market, users can also gain access to more sophisticated application.
- **SAAS server may support many educational institutions: -** Since the application is running on a server farm, the scalability is inherent to the system. As student usage grows, the software performance will not degrade.
- **All subscribers' data held on SAAS server: -** Very high level of security is needed by SAAS providers in order to gain the trust of subscribers and sophisticated multitenant software architecture. The subscriber data is distributed between many providers and it must be integrated in order to gain over view of business, higher demand for system and data integrators.

Distance Education

Distance education is a field of education that focuses on teaching methods and technology with the aim of delivering teaching often on an individual basis to students who are not physically present in the traditional educational setting such as a classroom.

The Federal Government of Nigerian NPE 2014 views open and distance education as the mode of teaching in which learners are removed in terms of time and space from the teacher. It uses a variety of media and technologies to

provide and improve access to good quality education to a number of learners wherever they may be.

According to Mujibul (2008) distance learning is any type of education that occurs while location, time or both separate the participants. The teacher using technologies delivers instruction to the students at a separate location and receives feedback which can be immediate or delayed. Distance education offers more and more people the opportunity to learn at their convenience especially those who had no opportunity of being educated through the conventional regular programmes of tertiary institution.

To meet the growing demands of instructor/lecturers to teach students, new and innovative technologies such as cloud based e-learning need to be adopted. Many organizations are turning toward actual cloud adoption and deployment. Cloud based e-learning has the potential to become the next major driver of business innovation, as it promises to enable new business models and services across almost all industries (IBM, 2009; and Armbrust, 2010). Emphasizing on this Metz (2010) opines that ideally the distance learning staff will merely click a few button to get an application up and running in a matter of minutes if they are using the cloud services offered by the service providers.

Benefits of Cloud based E-Learning for distance education

The benefits that cloud based e-learning will give include the underlisted as posited by (Riahi, 2015:357)

1. **Low cost: -** E-learning computer users need not configure for e-learning applications. They can cloud applications through their PCs, mobile and smart phones, tablets with an internet connection to run with minimal configuration. Since the data is generated, the user need not spend more money for storing data or a local machine.
2. **Improved performance:**- Since the cloud based e-learning application have most of the applications and processes in the cloud, client problems do not create problems on performance when they are working.
3. **Instant update software:** Since cloud based applications for e-learning runs with super strength, super source software is automatically updated. As such e-learning receive updates.
4. **Improved compatibility with document formats:-** Due to the fact that some file formats and fonts do not open properly in some PCs,/mobile phones, the cloud powered e-learning applications do not have to worry about those kinds of problems. In fact, the cloud based e-learning applications open the file from the cloud.
5. **Benefits to students:-** Students benefit more from the cloud based e-learning. This is very relevant for the distance education programmes. Students can take online courses, take exams and receive feedback online about their projects and assignments from their teachers/lecturers.

6. **Benefits to teachers:-** Teachers/lecturers also benefit from cloud based e-learning. Teachers can deliver their lecturers online, including their tests for students, homework, projects undertaken by students. Through the online forum interaction goes on between lecturers andtheir students.

7. **Information security:-** Data security is of great concern both for individuals and for companies. This is due to the fact that software and data are located on remote servers which can crash or disappear without warning. However cloud computing provides some major security benefit to customers using e-learning as it proffers solutions to this problem.

Disadvantages of Cloud based e-learning

Riahi (2015) citing Jollife, Ritter and Stevens, Kwan, Fox Chan, Tsang (2008) pointed out the following as disadvantages or weakness of cloud based e-learning.

- In the present situation e-learning system and the scalability of the infrastructure is still weak.
- Cost of purchasing aid in maintaining computers is quite high large.

Other challenges of cloud computing in distance education as noted by Inyang-Abia (2015: 51-52) include the following;

- Overhead, access and maintenance costs too high.
- Work ethics: Most employers lack job concern and ethics
- Political will for transformation
- Infrastructural deficiencies
- Ineffectiveness in electricity supply
- Systems and infrastructural decay
- Limited internet outlets and slow connectivity
- Personnel such as technicians, engineers and teachers are inadequate in terms of both quality and quantity.
- Security of equipment and materials; personnel/job, cyber space, data/information and personal credentials pose serious challenges to the success of cloud computing.

Conclusion

The issue of integrating cloud based e-learning into the distance education programme has been emerging in recent years. Its nature of the provision of anytime anywhere and any place education popularizes it among professionals and learners seeking for upgrades in their career. Learners are attracted more to it by its many advantages among which includes itsflexible nature where schedules are at the learners' discretion as well as pace. Through the cloud based e-learning in cloud computing a better platform/environment is created making online and distance education more popular and convenient to access. This goes on the make distance education through e-learning and cloud computing one of the best feasible solutions towards the

education of the teeming population of Nigerian students especially those who are employed. This is very necessary as it will improve the process of teaching and learning considering the globalization of the world systems today of which education is not left out.

Recommendations

The authors proffered the following recommendations:

- ❖ Costs by cloud service providers should be reducedor subsidized to a minimal level to make it affordable to consumers.
- ❖ There should be more spirited efforts by governments to provide equipment's and infrastructure.
- ❖ Security issues should be popularized through legislating against cyber-crime, decadent technologies and electronic waste.
- ❖ Government should ensure regular power supply.
- ❖ There should be job creation aswell as increased training of personnel.
- ❖ Adequate motivation and special scholarships.
- ❖ There should be liberalized ICT-related policies and sponsored subsidized outlets.
- ❖ NGOs/agencies and corporations should make donations to enhance this programme.

References

Aremu, D.R., Jacob, B. P. & Ogedebe, P.M. (2013) Cloud based e-learning model for open and distance learning in Nigerian Universities. *International Journal of science and research (IJSR). Retrieved from www.ijacsa.net.*

Awosan, R.K. (2014) *Factor analysis of the adoption of cloud computing in Nigeria. African journal of computing and ICT.* 7(1); 33-42.

Barnat, C. (2010). *A brief guide to cloud computing.* London: Robinson publisher.

Federal government of Nigeria, *National Policy on Education (2014)* Lagos: Federal Ministry of Education.

IBM (2009) *Business strategy for cloud providers: The case for potential cloud service providers.* White paper retrieved from *http://public.dhe.ibm/com/common /ssi/ecm/en/gbw03096usen/gbno3096usew.pdf.*

Inyang-Abia, M.E. (2014) *Clouds in the light kingdom: Reboot the curriculum.* Being a paper delivered at the 60th inaugural lecture. University of Calabar, UNICAL Press.

Inyang-Abia, M.E. (2015). *Cloud computing: open and distance education in Nigeria*. Being a lead paper presented at the 36th International conference of educational and media technologist association of Nigeria 12-16th Oct, Obudu. Cross River.

Mascuh, M.H., Anwar, H. and Huang, X (2012) An E-learning system architecturebased on cloud computing. *Journal world academy of science, engineering and technology, 62 (3) 125-135*.

Mell, P & Grance, T. (2009) *The NIST definition of cloud computing.* National institute of standards and technology. Retrieved from *http://cs.c.nist,gov/groups/sns/cloud-computing*.

Muhammad, A.R. & Abdulrahman, S. M. (2015) *Cloud computing basede-learning.* Opportunities and challenges for tertiary institutions in Nigeria. Retrieved *from doi.1017706/ ijeeevol.5no3pg144-152.*

Mujibul, H. (2008) *Administrative problems of open distance education.* Retrieved from *www.hrmars.com/admin/pics* /239.pdf on 2/7/16.

Ofondu, R.O. (2010) *Challenges facing teacher education in Nigeria issues and challenges in Nigerian education in the 21st century*. Onitsha: West and Solomon publishing coy Ltd p. 466-482.

Rilahi-G (2015). *E-learning systems based on cloud computing: A review*. International conference on soft computing and software engineering. Retrieved from *http://creative commons.org/license/www.sciencedirect.com.*on 22/6/16.

Sudhir, K.S., Nidhi, G. & Monisha, S. (2014). *Distance education technologies using e-learning and cloud computing international journal of computer science and information technologies* 5(2) 1451-1454.