

## Synchronous and Asynchronous Information and Communication Technology Tools: An Effective Delivery for Distance Learning Education in a Cloud Computing In Nigeria.

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### Abstract

*With the much cry for adequate effective delivery system for distance learning education in Nigeria. Synchronous and asynchronous information technology (IT) media if integrated fully into the programme according to the study might go along way for the needed delivery system. Synchronous tools allow for facilities, participants to chat at the same time and speed at different locations. While asynchronous allows for chatting from facilitators at the same time but participants can received their lesson at their own time. The school without a wall syndrome can be removed by the introduction of synchronous and asynchronous (IT) media tools. Cloud computing offers whole lots of opportunities for the use of internet. Its enormous benefits for distance learners lie also on the credibility of their certificate. Based on the finding, appropriate recommendations were made.*

**Keywords:** Synchronous, Asynchronous, Information Technology, Distance Learning, Cloud Computing.

### Introduction

Researchers and educators are advocating on the use of emerging technological tools for effective delivery system in our classroom as to bring about the paradigm shift from the teacher centred system to the learner centred system. Indicators today prove that the integration of these technologies especially in the third world or developing countries like Nigeria is at a snail speed. Some of the reasons advanced for the snail speed had always being that they are expensive and fear of maintenance and apathy for change. However, the need to integrate these innovations for effective delivery both at the regular or distance learning education cannot be over-emphasized considering the enormous benefits. The Federal Government of Nigeria fully appreciates the role of Information and Communication Technology (ICT) in national development and has put in place (in the year 2001) a policy document entitled the National Policy for Information Technology (IT). The [policy clearly spelt out the ICT mission, vision and policies for Nigeria.

The Federal Government of Nigeria (FGN 2013) acknowledged the importance of using ICT in improving knowledge and thus states in the national policy that government shall provide necessary infrastructure and training for the integration of ICT in advancing knowledge and skill in the modern world. The question is how far have these policies been implemented. The fact still remains that for a modern teacher in the 21<sup>st</sup> century to be relevant, he/she must be ready to accept the innovations and integration of these technologies in the system. Infact the facilitators or instructors and students of the distance learning education will benefits more and the confidence and capacity building of the granduands of the programme will be high.

Obi (2005) in her view describes ICT as a technological tools and resources used to communicate, create, organize, disseminate, store, retrieve and manage information. Adewoyin (2006) opined that a good number of researches have shown that the quality of learning and teaching can be significantly enhanced when ICT is approached and utilized as an intellectual multi-tool. These technological tools according to Chaka (2008) include computers, the internet, broadcasting technologies (radio and television) and telephone. In view of the importance attached to ICT, relevant bodies in education sector in Nigeria such as National Commission for Colleges have made the acquisition of basic ICT skills and capabilities part of National minimum standard for certification and practice at both Nigeria certificate in Education and degree in education. In the word of Njoku (2006) these developments are the strongest indication ever that the era of teachers without ICT skills are gone.

Synchronous ICT media are always time bound for both facilitators or learner or student to participate in the lesson at the same time though the lesson could be receive at different locations. While asynchronous is the opposite were participants are not required to receive lesson at the same time. Rather to access their course materials on their own schedules. The Macmillan Dictionary defines effectiveness as something that produces the results that were intended. Awotua Efebo (2002) averred that effectiveness is about doing the right thing. It is the foundation of success. In support of the use of IT media for effective delivery, Liver and Tournier (2002) opine that incorporating media technology into the classroom has become a global trend in recent years, schools and institutions of higher learning in Nigeria and the world-over are integrating multimedia into their educational curriculum to enhance the teaching learning practice. Lev Vygotsky's (1989) activity theory guide this study which requires the use of various IT tools by learners to interact with one another and with the facilitators through series of activities such as web logs, e-mail, instant chat, database etc. which assist the learners to be active participants during the instruction, therefore, learning by context, conversation and collaboration.

### **Concept of Synchronous ICT Media**

Synchronous e-learning involves geographically dispersed student accessing the same web-site at the time from an instructor. Synchronous communication involves real-time communication between teachers and learners most commonly in the form of text chat.

Macmillan English Dictionary defines synchronous as something happening at the same time or speed. Discussions in synchronous e-learning are related to social presence through chat by contributing to the continuity and convenience of the class, helped sustain regular contact and create a sense of urgency and immediacy. They are often very passionate to e-mail discussion following the scheduled chat sessions.

This type of learning is commonly supported by internet communication media such as video-conference and chat. The instructor typically "drives" a slide show presentation, which the students watch while connected to a conference web-site, students can ask questions or provide comments through phone line or through a chat window. In other words, participants communicate at the same communication tool (Kutto://books.google.com/books? Isbn 03980813x).

Synchronous tools enable real-time communication and collaboration in a "same time-different place" mode. These tools allow people to connect at a single point in time, at the same time. Synchronous tools possess the advantages of being able to engage people instantly and at the same point in time. The primary drawback of synchronous tools is that, by definition, they require same-time participation- different time zones and conflicting schedules can create communication challenges. In addition, they tend to be costly and may require significant bandwidth to be efficient.

Asley and Kaplan (2003) summarize the tools uses and challenges as a situation where the instructor and learner are present in the same learning environment at the same time through the internet. Thus, Learners are required to participate in activities based on a specific schedule and the instructor must organize instructional content, provide necessary motivation and feedback in real time, Table1 shows some examples of synchronous tools, their use and draw backs.

**Table I: Some Synchronous Instructional Tools, Their Uses and Challenges.**

S/ N	Tool	Useful for	Drawbacks
1	Audio conferencing	Discussion and dialogue	Cost, especially when international participation is involved
2	Web conferencing	Sharing presentations and information	Cost, bandwidth; may also require audio conferencing to be useful
3	Video conferencing	In-depth discussions with higher-touch interactions	Cost, limited availability of video conferencing
4	Chat	Information sharing of low-complexity issues	Usually require typing, “lower touch” experience
5	Instant messaging	Ad hoc quick communications	All users must use compatible system, usually best for 1:1 interactions
6	White boarding	Co-development of ideas	Cost, bandwidth; may also require audio conferencing to be useful
7	Application sharing	Co-development of documents	Cost, bandwidth; may also require audio conferencing to be useful

### Relevance of Synchronous ICT Media

- Synchronous media tools can improve recruitment, retention and student outcomes in your course by simultaneously teaching students who are physically in the classroom, students who are interacting with you and them in real time remotely through the internet, and students who review classroom lectures and experience asynchronously through recorded course archives
- Attend an instructor led class in person
- Participate in real time on the phone
- View archived classes any time via the internet,
- Review archived written class transcripts,
- Download classes to computers or mobile devices as audio or video pod-casts
- Work on lab exercises in person or via collaborative remote access to real equipment
- Confer with teachers interactively during in-person and online office hours

These lead to better student, faculty and department outcomes, including:

- Improved Student Recruitment
- Improved Student Retention
- Improved Student Completions
- Better Student Performance
- Improved Student Relationships
- More Engaging Classroom Experiences
- As more and more teachers master synchronous online course delivery, they can better student outcomes. (Students are better able to attend and successfully complete courses with multiple ways of accessing instruction.)
- Students benefit through greater, deeper and more consistent course availability.

### Concept of Asynchronous ICT Media

An asynchronous learning network is a collection of computer network technologies used to support collaborative learning to participate at different location, difference time and speed (Siddiqui 2009) pp 148). Macmillan English Dictionary defines asynchronous as relating to an electronic communication method that sends information in one direction, one character at a time, not happening at the same time or speed. In computer network asynchronous data transfer between two computers means that the data clock rate, coming out of the sending computer does not have to be running at the same speed as the receiving computer.

Asynchronous tools allow learners to reflect on their own learning process (meta-cognition) and therefore can improve their learning proficiency. Asynchronous communication and learning is a more popular learning type because many of the learning tools are free, require minimal hardware, and are used at the student’s pace (meloni, 2010).

Table II shows some examples of asynchronous tools, uses and challenges.

**Table II: Some Asynchronous Instructional Tools, Their Uses and Challenges**

S/N	Tools	Useful for	Drawbacks
1	Discussion boards	Dialogue that takes place over time	May take longer to arrive at decisions or conclusion
2	Web logs (blogs)	Sharing ideas and comment	May take longer to arrive at decisions or conclusion
3	Messaging (e-mail)	One-to-one or one-to-many communications	May be misused as a “collaboration tool” and become overwhelming
4	Streaming audio	Communication or teaching	Static and typically does not provide option to answer questions or expand ideas
5	Streaming video	Communicating or teaching	Static and typically does not provide option to answer questions or expand ideas
6	Narrated slideshows	Communicating or teaching	Static and typically does not provide option to answer questions or expand ideas
7	Web-based training	Teaching and training	Typically does not provide option to answer question or expand ideas in details
8	Documents libraries	Managing resources	Version control can be issue unless check-in / check-out functionality is enabled
9	Databases	Managing information and knowledge	Requires clear definition and skillful administration
10	Web books	Teaching and training	Not dynamic and may lose interest of users
11	Surveys and pools	Capturing information and trends	Requires clear definition of ongoing coordination
12	Shared	Coordinating activities	System compatibility

One good aspect of Asynchronous Instructional tools is that it slow down interaction which allows learners ample time for research, preparing for questions, facts from the findings to contribute to knowledge base and the subject matter of the lesson.

## Concept of Cloud Computing

Cloud computing is one of the most recent stage in the evolution of educational support services (ESS) which encouraged the most talk about paradigm shift from analog to digital technology for teaching, learning, research and to evaluate educational processes by institutions, stakeholders and governments though difficult to have a standard definition, the National Institute of Standards and Technology however says cloud computing is a model for enabling convenient, on-demand network access to share pool of configurable computing resources (network, services storage, application and services) that can be rapidly provisional and released with minimal management effort or service provider interaction (Dahunsi and Owoseni 2015, Zana et al, 2010).

According to Inyang- Abia, (2014), cloud computing describes any internet-based activity where groups of remote servers are networked to allow centralized data storage and on-line access to computer resources and services. One can summarize thus, that cloud computing is a process that allows users to operate platforms or use network of remote servers or internet enabled devices to store, retrieve, manage and process data. From the fore-going, there is no doubt that distance learning education is already taking advantage of these emerging digital tools to aid teaching, learning and research. These platforms or digital tools if properly integrated and provided for our Educational system has enormous potential and it is cost effecton, speed and flexible. Armbrust (2009), Categorize cloud services into three main models:

- Infrastructure as a service (IaaS) which refers to on-demand provisioning of infrastructural resources in terms of virtual machine
- Platform as a service (PaaS) which refers to providing platform layer resources, including operating system support and software development.
- Software as a service (SaaS) which refers to providing on-demanding applications over the internet such as salesforce.com,youtube,facebook. Also in Dialogic (2010) Cloud Computing can be developed according to these main models for the cloud architecture solutions:
  - Private Cloud- The cloud infrastructure is deployed, maintained and operated for a specific organization with multi campuses or a third party.
  - Community Cloud- Community cloud shares infrastructure between several organizations from a specific community with similar interests, requirements and common concerns. (security, jurisdiction etc)
  - Public Cloud- Cloud infrastructure is available to the general public on a commercial basis by a cloud service provider.
  - Hybrid Cloud- The Cloud infrastructure consists of combination of the three mentioned above. The Cloud have the ability through their interfaces to allow data and/or applications to be moved from one cloud to another.

## Concept of Distance Learning Education

Distance education can be defined as a system of education in which there is a quasi-separation of the learner and the teacher or instructor or facilitator in time and space. The instructors/ instructional materials and teaching methods are subsumed into the learning materials (popularly referred to as study materials) that have been designed as a self-directed learning guide for the students.

However, difference nomenclatures have been used by scholars to convey the concept of distance education such as open learning, open University, correspondence, on-line learning and distance learning. The following features are common of all these; the courses and questions as written, printed and sent to the learners by post, the learners study the courses, answer the questions and also sent them in written form to the instructors for correction. Learners also take some time to read and write responses to exercises or examination questions set on the course. Likewise, teachers take some time to mark, assess check and award grades and mailed back to

learners. They are like schools but without walls or open learning situations where the choice of time and place to study becomes that of the learners.

Distance education though operate like open learning is not absolutely without a walls because the students are identified and grouped. Holmberg (1981) defines it as various form of study which are not operated under the contiguous and direct supervision of teachers and their students on the same premises or lecture rooms but which benefit from the planning and guidance of an educational organization.

### **Major Features of Distance Education**

- 1 The separation of the teacher and learner is time or place in both time
- 2 The use of technical media involving mixed media course ware such as print, radio and television broadcasts, video and audio cassettes, computers, telecommunication
- 3 The provision of two-way communication allowing for interaction between learners and tutors either synchronously as opposed to the passive receipt of broadcast signals.

### **The Purpose for Distance Education**

Distance education as a system serves so many purposes:

- (I) Continued demand for university education
- (II) On the job improvement
- (III) Inability of existing conventional educational institutions to accommodate increasing population
- (IV) Lack of facilities and capable hands in the existing universities
- (V) Inability to attend the regular system of education on account of their physical, mental, emotional and social handicapped condition
- (VI) Those denied admission into regular system of school
- (VII) Those who are poor and cannot afford the cost of regular system.

### **Challenges of Distance Education Programme in Nigeria**

Inspite of the fact that distance education systems facilitates skills and knowledges acquisition to those supposedly deprived ones. The programme is still bedeviled with so many problems:

- Instability of electricity supply: The errantic power supply in Nigeria does grossly cause a setback in the full implementation of the distance education programme. This in many instances often leads to outright cancellation or abandonment of educational programme.
- Obsolete and poorly managed institutional facilities: most of the instructional facilities (especially in broadcasting and study centre) in Nigeria are too old and do not reflect the state of Art. These facilities are therefore out of date and cannot support efficient and effective educational processes. This situation is worsened by ill-maintenance due to lack of spare parts, greed of managers and general attitude of Nigerians to maintenance.

### **The Relevance of Synchronous and Asynchronous Instructional Tools as a Delivery System for Distance Learning Education in A Cloud Computing**

Distance learning education delivery system needs to change and improve to give the much needed credibility to the certificates obtained from the programme. Over the years there have always been calls for alternative delivery models and system in the educational system especially for the distance learning education, but obviously with limited success especially in developing countries like Nigeria since educational practice is

politicize. Even with the emergence of internet technologies which offer ample possibilities such as e-learning, net-based learning, cloud computing, synchronous and asynchronous ICT media etc, Nigeria and other developing countries still complained of funds and maintenance of these facilities.

The facts still remains that the use of these technologies visa-vis computer networks brings new alternatives to transform teaching and learning. The enormous benefits from the use of these synchronous and asynchronous ICT media in the effective delivery for distance learning education should be blended with the existing practice of delivery system. It is a known fact that Information Technology (IT) can be used to improve educational practices. One of the ways is to start changing our pedagogy, from the traditional pedagogical ideas with IT use.

Synchronous e-learning involves geographically dispersed students accessing the same web-site at the same time as an instructor. This type of learning is commonly supported by internet communication media such as video conferencing and chat. The instructor typically drives a slide show presentation, which the students watch while connected to a conference web-site. Students can ask questions or provide comments through the phone line, or through a chat window. In other words, participants communicate at the same time, from different locations using the same communication tool ([http://books. Google.Com.ng/books? Isbn-3980813x](http://books.Google.Com.ng/books?Isbn-3980813x)).

The relevance of synchronous e-learning is the capability for the students or participant to learn at the same time with others at his/her location while the teacher or facilitator is teaching. The interaction between learners and facilitators is very unique as against the traditional e-mailing, correspondence, and school without a wall syndrome. Also, from the social perspective, there is emotional feeling between the teachers and the learners while chatting. There are certainly enormous benefits in using synchronous IT tool for various forms of distance learning education.

The relevance for asynchronous learning cannot also be over-emphasized considering the array of technologies combined to create an electronic environment to support teaching and learning for students working at different times. The main ingredient of an asynchronous IT tool is the ability for students or participants to receive lesson anywhere and at their own time. Another important advantages of asynchronous is convenient access, it does not require immediate response or interaction like synchronous, students or participants are giving time to think, bring out ideas, questions and comments to be shared with the facilitators and other students.

Also, asynchronous IT system relied mostly on text-based and therefore allows for more participants to articulate their opinions especially on difficult questions.

The potential in using asynchronous technology for various forms of distance learning education for effective delivery in a cloud computing environment is enormous and therefore the need for full integration into the programme. The Cloud has enormous promise for better education in Nigeria especially the distance learners. Already, a good percentage of students are using cloud service through social network platforms. Tertiary institutions and parastatals like Joint Admission and Matriculation Board (JAMB) run their examinations through these platforms. Universities in Nigeria today run courses through e-platform for example University of Uyo offers e-learning programme in the department of economics. The cloud provides opportunity for users to access systems through their devices (phones, laptops) from anywhere and time with secure network access.

The ubiquitous nature of the cloud will allow distance education learners and facilitators to do their assignment, test, and examination of session, facilitate course work and provide virtual platforms from student to student and students to facilitators interaction. Thus, removing the barriers of school without a wall which was a major feature of distance education. In addition to credibility and efficiency, time saving and the quality and capacity of the certificates and graduates of the programme will improved.

## **Conclusion**

For distance learning programme to function maximally, the government, stakeholders and operators should be open to the worldwide access which is being in use all over the world to create virtual web platforms. In Nigeria today, Banks, aviation communications and other sectors are operating mobile systems. thus distance learning and indeed the education system in Nigeria should integrate synchronous, asynchronous media tools for effective delivery system in a cloud computing.

### **Recommendations**

Based on the findings of this paper, the following recommendations were made:

- Full implementation of the information technology policies as earlier promulgated by government
- Provision of technology-driven learning environment in all our schools starting from the primary, secondary, tertiary and distance education
- Full integration of synchronous and asynchronous ICT media in all distances learning education programmes
- Re-training of teachers as to remove the apathy of new technologies.

### **REFERENCES**

Awotua-Efebo, E.B (2002); Effective teaching principles and practice; Port Harcourt paragraphs.

Adewoyin, J.A (2006) The place of information and communication Technology in Designing and utilizing instructional material in C.O Tiamiyu: Understanding New Technology in instructional medial materials Utilisation. A book of proceeding on a one Day Train the Trainer open workshop (48-68)

Chaka, J. G (2008): Information and communication Technology (ICT) as a vital Tool in the Education Sector reform in Nigeria. Nigeria Journal of sociology in Education (NJSE).2, (2), 182-190

MacMillan English Dictionary for Advanced Lerner (2007) New Edition.

Inyang- Abia, M.E (2014). Clouds in the “Light Kingdom” : Reboot the curriculum 60<sup>th</sup> in augural lecture of the University of Calabar: University of Calabar.

Kaplan, S and Ashlay, J. I. (2003) Beyond the breakout room: How technology can help sustain community. [http://www. . asaccenter.org/ Resources/ articledetail.Cfm? iternumber=13572](http://www.asaccenter.org/Resources/articledetail.Cfm?iternumber=13572).

Meloin, J (2010) Tools for synchronous and Asynchronous classroom discussion (online blog) the chronicle of higher education ([http. // chronicle. Com /blogs / prof hacker / tools – for – Synchronous asynchronous – classroom – discussion/ 22902](http://chronicle.Com/blogs/prof_hacker/tools_for_Synchronous_asynchronous_classroom_discussion/22902))

Federal Republic of Nigeria (2013) National policy of education. Abuja NERDC.

Njoku, Steve (2006). Teacher, ICT and the challenge for the 21<sup>st</sup> Century. A Journal of Today’s Education. 10, (3), 1-5.



- Obi, V.C (2005). Information Communication Technology skill Needed by Business Education Teachers for Effective Instruction in the secondary school in Enugu State. The Journal of World council for curriculum and instruction, Nigeria. Chapter 4, (2), 99-106.
- Oliver, R.I and Towers, S (2000). Benchmarking ICT Literacy in tertiary learning settings. In R. Sims, M. O Reilly and S. Saw kins (Eds) Learning to choose to learn proceedings of 17<sup>th</sup> Annual.
- Siddiqui, M.H (2009). Educational Technology: APH publishing cooperation. Ansari Road, Darya Gaji, New Delhi.
- Dahunsi, F. M and Owoseni, T. M (2015) “Cloud computing in Nigeria; the cloud ecosystem perspective in Nigerian Journal of Technology Vol. 34 No. 1 January pp 209-216
- Armburst, M ert.al (2009), “ Above the clouds. A Berkeley view of could computing”, 2010; pdf. Accessed August 24, 2015.
- Dialogic corporation White paper, “Introduction to cloud computing,” 2010; pdf Accessed August 24, 2015
- [http:// books. Google. Coming/ books? Isbn-3980813x](http://books.google.com/books?isbn=3980813x)
- [Kutto:// books, google.com.ng/books? Isbn 03980813x\)](http://books.google.com.ng/books?isbn=03980813x)
- Vygo+Sky,L.(1978) Mind in society: the development of higher psychological process Cambridge: Harvard University Press.