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http://ijeps.truescholar.org

INNOVATIVE PEDAGOGIES IN EDUCATIONAL TECHNOLOGY; THE CLOUD COMPUTING EXPERIENCE

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ABSTRACT

As the world evolves at a rapidly high speed it becomes imperative that educational technologist and indeed all key players in the educational sector embrace these evolutions and position themselves to benefit from the advantages promoted by changing with the changing times. Education plays a huge role in bringing forth sustainable national development as it ensures the populace and government alike are equipped with the needed tools to achieve developments that are not just temporary and transient but sustainable. Education is an essential tool for achieving sustainability. People around the world recognize that current economic development trends are not sustainable and that public awareness, education, and training are key to moving society toward sustainability. It is no news that information and communication technology is the major catalyst championing this paradigm shift from a priori expectations and methods. One of the landmark achievements in the ICT sector is the development, adoption and deployment of cloud computing in all aspects of human endeavors. This paper however introduces the basic concepts of cloud computing, educational technology and innovative pedagogies as well as x-rays the innovative pedagogies that educational technologists ought to integrate into the teaching and learning process as are provided by cloud computing In other to better achieve overall national sustainable development.

KEYWORDS: Cloud computing, Innovative Pedagogies, Educational Technology, Sustainable Development, Information Technology

INTRODUCTION

Cloud Computing is not a very new concept in IT, in fact Cloud Computing is a more advanced version of the Data Processing Service Bureaus that we had 40 years ago. Nevertheless, the best known companies in the IT field offer or will shortly offer Cloud Computing services to a range of customers from organisations of all sizes to individuals. The biggest and best known Cloud Computing providers include Amazon with EC2, Microsoft with Azure and Google with GoogleApps (e.g. Gmail, Google Docs, Google Calendar) . The paradigm of Cloud Computing can be described in simple terms as offering particular IT services that are hosted on the internet, the most common ones being Platform as a Service (PaaS), Infrastructure as a Service (IaaS) and Software as a service (SaaS).

Cloud computing is a form of distributed computing that provides information technology (IT) services as a commodity and enable users to benefit from the efficient use of computer resources, (Radack, 2012). Users are able to control the computing service they access while sharing the investment in the underlying IT resources with other consumers. When computing resources are provided by another organization over wide area network, cloud computing becomes similar to an electric power utility platform.

The National Institute of Standard and Technology (NIST, 2011) defined cloud computing as " a model for enabling convenient on-demand network access to a shared pool of configurable computing resources (eg network , servers, storage, application and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction . According to Kuyoro S.O et al 2011, cloud computing is defined "as a set of IT service that are provided to a customer over a network on leased basis with the ability of scaling up or down their service requirement". Usually, cloud computing service are delivered by a third party provider who owns the infrastructure. Cloud computing is a

model for enabling convenient, on demand network access to a pool of configurable computing resource that can be rapidly provisioned and released with minimal management effort or service provider interaction (Mell and Grande 2009). It reduces the capital expenditure and operational expenditure involved in the IT infrastructure of an organization. Cloud computing offers an innovative business model for organization to adopt IT services without upfront investment. Cloud computing encompasses activities such as use of social networking sites and other forms of interpersonal computing. However most of the time, cloud computing is concerned with accessing online software applications, data storage and processing power. Cloud computing is a way to increase the capacity or add capabilities dynamically without investing in new infrastructure, training new personnel or licensing new softwares. It extends information technology's existing capabilities (Kuyoro et al 2011).

ITU – T technology watch 2012, states that cloud computing refers to the ability to access and manipulate Information stored on servers using an internet enabled platform, including Smartphones. Computing facilities and application will increasingly be delivered as a service over the internet. Furthermore, it states that we are already making use of cloud computing when for example we use application such as Google mail, Microsoft office 365 which is the software as a service commercial offering of Microsoft office or Google docs. In the future they went on to emphasize , that governments companies and individual will increasingly turn to cloud. The cloud computing paradigm changes the way in which information is managed, especially where personal data processing in concerned. End – user can access cloud service without the need for any expert knowledge of underlying technology, without knowledge of the physical location of the server or of how the processing of personal data is configured end user consume cloud service without any information about the process involved.

CLOUD DEPLOYMENT MODELS

Cloud computing can be deployed in four different models namely ;

i. Private cloud - enterprise owned or leased
ii. Public cloud - sold to the public mega scale infrastructures
iii. Hybrid cloud – the combination of two or more cloud types
iv. Community cloud - shared infrastructure for specific community (Lumley , 2010).

Private Cloud :- Private cloud computing is a new term that some vendor have recently used to described offering that emulate cloud computing on private network. It is set up within an organization's internal enterprise data centre (Kuyoro et al , 2011). In private cloud, scalable resources and virtual application provided by the cloud vendor are pooled together and available for cloud user to share and use. It differs from public cloud in the sense that all the cloud resources and application are managed by the organization itself, similar to intranet functionality. Utilization on the private cloud can be much more secure than that of public cloud because of its specified internet exposure. Only the organization and designated stakeholder may have access to operate on a specific private cloud (Arnold 2009).

Public Cloud: Public cloud describes cloud computing in the traditional mainstream sense, whereby resources are dynamically provisioned on a fine – grained basis over the internet via web application / web services , from an offsite third provider who share resources on a bills on a time –grained utility computing basis (Kayoro et al, 2011) . It is typically based on a pay - per use model, similar to a prepaid electricity metering system which is flexible enough to cater for spikes in demand for cloud optimization. A Platform Computing White Paper 2010, elaborates that public clouds are less secure than other cloud models because it places additional burden of ensuring all applications and data accessed on the public cloud are not subjected to malicious attacks.

Hybrids Cloud:- Hybrid cloud is a private cloud linked to one or more external cloud services, centrally managed, provisioned as a single network unit and circumscribed by a secure network (Global Netoptex Incorporate, 2009). It provides virtual IT solutions through a mix of both public and private clouds. Hybrid cloud provides more secure control of the data and applications and allows various parties to access information over the internet. Hybrid cloud can describe configuration combining a local device, such as a plug computer with cloud services. It can also describe configuration combining virtual and physical, collocated assets - for example a mostly virtualized environment that required physical servers, router or other hardware such as a network appliance acting as a fire wall or span filter.

Community Cloud: Community clouds is a multi – tenant infrastructure that is shared

among several organizations from a specific group with common computing concerns (Rouse, 2012).

Community cloud is a collaborative effort in which infrastructure is shared between several organization from a specific community with common concerns (security, compliance, jurisdiction etc) whether managed internally or externally, (Wikipedia)

The goal community cloud is to have participating organization realize the benefits of a public cloud such as – multi- tenancy and a pay - as –you billing structure, but with the added level of privacy, security and policy compliance usually associate with private cloud.

The community cloud can be either on – premises or off - premises, and can be governed by the participating organization or by a third – party managed service provider (MSP).

The cost for community cloud are spread over fewer user than a public cloud but more than a private cloud, so only some of the cost savings potential of cloud computing are realized (The NIST, 2011; Briscoe and Marinous, 2009).

CLOUD SERVICE MODELS

The three cloud service delivery models are

i. Application / Software as a Service (SaaS)
ii. Platform as a Service (PaaS)
iii. Infrastructure as Service (IaaS)

These three classic cloud service ,model have different divisions of responsibility with respect to personal data protection. The risk and benefit associated with each model will also differ, and need to be determined on a case – by – case basis and in relation to the nature of the cloud service in question.

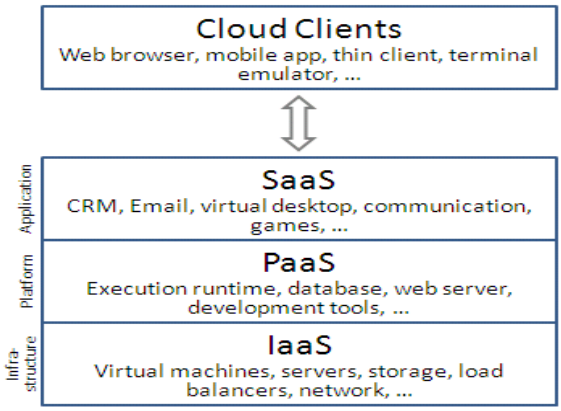

Figure 1. Diagram of the Cloud Service Models

Software as a Service (SaaS):

Software as a Service is a software distribution model in which application are hosted by a vendor or service provider and made available to customer over a network, typically the internet, (Kuyoro et al,2011). SaaS enables the consumer to use the providers applications running on a cloud infrastructure. The applications are accessible from various client devices through a client interface such as a web browser (eg web based email such as Gmail or CRM from sale force) . With the SaaS models, the consumer has little or no influence on how input data is processed, but should be able to have confidence in the cloud providers' responsibility and compliance or can control which input he gives to a SaaS. First of all he may avoid giving sensible data to SaaS secondly he might be able to "Secure" the sensible data before he inputs them to into the SaaS , examples their exist plug-ins for browsers supporting encryption of input from filed this could be used to send only encrypted mails using Gmail, (ITU-T Technology watch, 2012).

Platfrom as a Service (PaaS)

According to Kuyoro et al 2011, platform as a service is a set of software and development tools hosted on the provider servers. This offers an integrated set of developer environment that a developer can tap in to build their application without having any clue about what is going on underneath the service. It offers developers a service that provides a complete software development life cycle management from planning to design to building application, to deployment, to testing, to maintenance. PaaS provides tools supported by a cloud provider, that enable developers to deploy applications (e.g saleforce force .com, Google APP Engine, Mozilla Bespin, Zoho creator etc) (ITU-T Technology watch 2012). On the other hand a big responsible lies with the developer to use best practices and privacy - friendly tool. The developer however has to rely on the trust worthiness of the underlying Paas and related infrastructure. Client using Paas service transfer even more costs from capital investment to operational expense but must acknowledge the additional constraints and possibly some degree of lock -in posed by the additional functionality layers (Global Netoptex Incorporated , 2009).

Infrastructure as a Service (IaaS)

Infrastructure as a service is a single tenant cloud layer where the cloud computing vendor's dedicated resources are only shared with contracted client at a pay – per use fee . This greatly minimize the need for huge initial investment in computing hardware such as serves, networking devices and processing power.

They also allow varying degrees of financial and functional flexibility not found in internal data centre or with collocation services, because computing resource can be added or released much more quickly and cost –effectively than in an internal data centre or with model a collocation services (Brodkin , 2008).

IaaS is the model that guarantees more direct control but also leaves the customer responsible for the implementation of technical and procedure security and reliance measure (ENISA, 2009). Iaas provides the customer with computing resources to run software. An Iaas provider will typically take responsibility for securing the data centers network and system, and will take steps to ensure that its employees and operational procedure comply with applicable laws and regulation. One example of Iaas is Amazon EC2 web services.
ITU –T technology watch , 2012 indentifies the five key characteristics of cloud computing and they include;

1. On demand self service
2. Ubiquitous network access
3. Location – independent resource pooling
4. Rapid Elasticity - this enables the scaling up or down of resources.
5. Measured service - this is such that cloud provides control and optimize the use of computing resources through automated resource allocation load balancing and metering tools. All these five characteristics put together are geared toward seamless and transparent cloud use.

On the other hand, The National Institute of Standards and Technology's definition of cloud computing identifies "five essential characteristics" of cloud computing which include;

1. On-demand self-service. A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.
2. Broad network access. Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations).
3. Resource pooling. The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.
4. Rapid elasticity. Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear unlimited and can be appropriated in any quantity at any time.
5. Measured service. Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service. (National Institute of Standards and Technology, 2011).

Educational Technology; A Conceptual Overview

Educational technology refers to hardware and software, including televisions, radio, electronic classrooms, instructional devices, still and motion pictures projectors, computer assisted or managed instructional equipment and materials, communications equipment for educational application, and other equipments and materials necessary to assist the process of learning. This definition however, restricts educational technology to instructional media, with emphases or gadgets used to assist learning. Comprehensively educational technology is defined as a complex, integrated process involving people, procedures, ideas, devices and organization for analyzing problems and devising, implementing evaluating, and managing solutions to these problems involved in all aspects of learning. Educational technology however, Involves not only devices, equipment and media but also people, procedures, ideas and organization.

Emphasizes on a systematic process of analyzing problems and devising, implementing evaluating and managing solutions to the identified problems employs an integrated, holistic problem solving approach

Identifies the kind of problems that concerns educational technology as those problems that pertain to all aspects of human learning. It is concerned with the total educational environment not only with its components.

Rowntree, (1974) identifies four phases of educational technology as follows:

Objectives: This involves analyzing aims, specifying objectives and designing criterion tests.

- Design of learning
- Evaluation
- Improvement

A summary of the functions of educational technology, include;

- Improvement of instruction.
- Education of more people.

- Boosting research hence fostering learning more about learning.
- Reformation of the curriculum.
- Improvement of methods and processes of education.
- Articulation of the system generally.

In Nigeria however, educational technology centers are non-existent in most schools and colleges, higher institutions both at the National State and Local Government Levels, This is as A Result of the Following Factors:

- irregular power supply
- Teaching loads that leaves the teacher with little or no time to adopt and use educational technology tools and techniques.
- Lack of relevant educational media in majority of subject areas.
- The Nigerian educational system places much emphasis on examinations and certification thereby limiting the extent to which educational technology tools and techniques can be used in the instructional process.
- Lack of professionalization of educational technology in Nigeria is a major constraint.
- Maintenance problems exist; also there is lack of spare parts to maintain devices.
- Poor funding by the government also poses a constraint.
- High overhead cost to finance Edu-Tech facilities is also a limitation.

Applications Of Information And Communication Technology In Educational Technology

Computers are applied in educational technology two main ways, they include:

- Computer-managed instruction
- Computer-assisted instruction

Computer-managed instruction encompasses testing, recorded keeping and reporting softwares. Computer-assisted instruction referrers mainly to drill-and- practice, tutorial and simulation software.

According to Robinson (1990), information and communication technology serves three main functions in educational technology and they include.

- To deliver all or part of the learning content to learners.
- To supplement and extend content provided in different forms (e.g. print).
- To provide a two- way channel of communication for exchange between tutors and students with their peers for feed back or for learning, problem-solving, advice, debate and support.

ICT performs the following roles as well in education technology

- Help in design and development of learning materials. Learning materials may be downloaded from the internet; however, they materials must be adapted to suit the specific instructional objectives.

Electronic Teaching Materials such as books, journals, etc can be exchanged through ICT. Through ICT, we can access, store and analyze information in electronic forms so far as they exist in virtual formats.

- ICT helps in research as it gives access to a world of resources, especially in electronic form
- Students' data, personnel administration, purchasing and supplies, advertisement can be handled with ease using ICT.
- Independent study and individualized instruction are facilitated by ICT. Robyler(2003), identifies the following classification of computer resources in education to include;

1. Instructional software's which perform functions such as

- Tutorial activities
- Drill and practice activities
- Simulations
- Instructional games
- Problem solving courseware

2. Software tools: these are software's that support students and teachers in their work, they perform functions such as:
   - word processing, e.g. MS Word
   - spread sheet: e.g. MS Excel
   - database management e.g. Ms Access
   - Material generation such as seen in Desktop publishing software, test generators, test question banks, worksheet and puzzle generators.
   - Data collection and analysis such as grade books, statistical packages, data management and testing tools
   - Graphic design; such as print graphic packages, Draw/print and image processing programmes, charting /graphic software, clip art packages, video collections, sound collections, digitizing systems and video development systems
   - Planning and organization; examples outlining tools and either writing aids, brain storming and concept rapping tools, lesson planning tools, and schedule/calendar maker and time management tools.
   - Research and referencing; example electronic encyclopedias, atlases and dictionaries.
3. Multimedia and hypermedia software's. These perform functions such as combining different media forms for the purpose of information dissemination. They come in various formats that include

- Interactive video discs (IVDs)
- Compact Disc read only memory (CD-Rom)
- Digital versatile disks (DVDs)
- Compact Disc-Interactive (CD-1)
- digital video interactive (DVI)
- Photographic compact (photo CDS)

4. Internet resources: these include:
    - Web browsing and searching resources e.g. web browsers, search engines, gophers and digital resource centers.
    - Communication in writing on the internet e.g. E-mail, list serve, bulletin boards, chat rooms and instant messaging.

Sustainable National Development: A Highlight

Sustainable development is a process for meeting human development goals while sustaining the ability of natural systems to continue to provide the natural resources and ecosystem services upon which the economy and society depends. While the modern concept of sustainable development is derived most strongly from the 1987 Brundtland Report, it is rooted in earlier ideas about sustainable forest management and twentieth century environmental concerns. As the concept developed, it has shifted to focus more on economic development, social development and environmental protection for future generations.

When the World Commission on Environment and Development (Brundtland Commission) published its report in 1987, it presented a new concept - sustainable development. The concept became one of the most successful approaches to be introduced in many years. In fact, it helped to shape the international agenda and the international community's attitude towards economic, social and environmental development. Sustainable development is a difficult concept to define; it is also continually evolving, which makes it doubly difficult to define. One of the original descriptions of sustainable development is credited to the Brundtland Commission which defines Sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987 sited in McKeown Rosalyn, 2002).

Sustainable development is the organizing principle for sustaining finite resources necessary to provide for the needs of future generations of life on the planet. It is a process that envisions a desirable future state for human societies in which living conditions and resource-use continue to meet human needs without undermining the integrity, stability and beauty" of natural biotic systems.

Education And Sustainable Development

The relationship between education and sustainable development is complex. Generally, research shows that basic education is key to a nation's ability to develop and achieve sustainability targets. Research has shown that education can improve agricultural productivity, enhance the status of women, reduce population growth rates, enhance environmental protection, and generally raise the standard of living. Education directly affects sustainability plans in the following three areas:

Implementation: An educated citizenry is vital to implementing informed and sustainable development. In fact, a national sustainability plan can be enhanced or limited by the level of education attained by the nation's citizens. Nations with high illiteracy rates and unskilled workforces have fewer development options. For the most part, these nations are forced to buy energy and manufactured goods on the international market with hard currency. To acquire hard currency, these countries need international trade; usually this leads to exploitation of natural resources or conversion of lands from self-sufficient family-based farming to cash-crop agriculture. An educated workforce is key to moving beyond an extractive and agricultural economy.

Deciscion Making: Good community-based decisions - which will affect social, economic, and environmental well-being - also depend on educated citizens. Development options, especially "greener" development options, expand as education increases. For example, a community with an abundance of skilled labor and technically trained people can persuade a corporation to locate a new information-technology and software-development facility nearby. Citizens can also act to protect their communities by analyzing reports and data that address community issues and helping shape a community response. For example, citizens who were concerned about water pollution reported in a nearby watershed started monitoring the water quality of local streams. Based on their data and information found on the World Wide Web, they fought against the development of a new golf-course, which would have used large amounts of fertilizer and herbicide in maintenance of the grounds.

Quality of Life: Education is also central to improving quality of life. Education raises the economic status of families; it improves life conditions, lowers infant mortality, and improves the educational attainment of the next generation, thereby raising the next generation's chances for economic and social well-being. Improved education holds both individual and national implications.

Innovative Pedagogies In Educational Technology

Pedagogy is a noun that refers to the method and practice of teaching, especially as an academic subject or theoretical concepts. Wikipedia defines pedagogy as the discipline that deals with the theory and practice of education. it thus concerns the study and practice of how best to teach. Its aims range from the general (full development of the human being via liberal education) to the narrower specifics of vocational education (the imparting and acquisition of specific skills). Pedagogy also refers to the art or science of teaching; education; and instructional methods. This includes the function or work of a teacher which is teaching. Pedagogy is the study of being a teacher, or the process of education. Pedagogy as a science explores the processes by which society deliberately can transmit its accumulated knowledge, skills and values from one generation to another, from one hand to another, and activate individual person's growth from another. The major pedagogical question is how to educate a human being; how to enhance learning and meet the needs of various types of learners.

Innovative pedagogy therefore, is the study of being an Innovative educator or the process of innovative educational teaching. The key question of Innovative pedagogy include; what are the educational, psychological, organizational factors/conditions that have a formative utmost effects on the mind, character or physical ability of an individual. the main steps of thinking on Innovative process construction are:

5. what is desirable for users
6. what is possible with curriculum and technology
7. what is viable at educational market
8. what is beneficial for the community
9. what is sustainable for the environment

Innovative pedagogy as a science and practice has a responsibility to prepare citizens of the knowledge society who are able to be creative, face changes, manage and analyze information, and work with knowledge. Innovative pedagogies based on ICT can be a passport for social change. It is very easy to shift to ICT based pedagogies because ICT is everywhere and anybody even the person who is nobody can access internet and be in touch with the world. All over the world, schools and teachers are in various stages of reform to adapt their instructional practices and educational systems to be more effective. The role of teachers has shifted from being a subject matter expert who transmits information, to acting as a facilitator of student learning in the knowledge society. Current reforms emphasize teachers develop students' capabilities in problem solving, teamwork and learning to learn, and reflective thinking.

As a migrant worker during the great depression, Eric Hoffer wrote "In times of change, learners inherit the earth, while the learner find themselves beautifully equipped to deal with a world that no, longer exists", (Jensen, 2015). It would be foolish of us to think that times are never changing, a quick look around us would point out to both teachers and students that the changing times are here. A look around us will reveal one or more tools or materials that we use daily that did not exist even five years ago. We find ourselves engulfed in a constant flux of change. And for sure, technology is the main source of these dynamic changes. Judging from the premises of Hoffer's statement, we can deduce that those who learn from change, or those who embrace and adapt to change are those who are first to benefit from change. Whereas those who hold on to the present, those who are too skeptical of embracing, accepting and adapting to change will remain masters of what is no longer efficient.

A hand full of educationists, educational inspectors, researchers and luminaries always make the mistakes of thinking cloud computing is the future of science and technology. Suffice it to say that this assertion is a wrong notion. Cloud computing is not the future. The cloud is a current technology standard. And if we borrow a leaf from Hoffer's argument, those teachers, lecturers, professors and other specialists in educational technology who adapt quickly to change and accept change, those who change with changing times will be the first to benefit and get a leg up on the competitive and rapidly changing world in which we live in.

Cloud computing has a long list of benefits to the educational sector in the sense that these cloud benefits are so numerous and cannot be duplicated easily by traditional client server software.

- Accessibility: This is perhaps the crowning benefit of managing the educationist's practice on cloud. A lecturer, having his students' data, results; lecture materials, publications, etc on cloud becomes instantly available from any location with nearly any device connected to the internet without any additional software or configuration. Accessibility is a natural advantage of the cloud, whereas with client server software, extending accessibility is more like wearing prosthesis.
- Better data security, much simpler maintenance, reduced hardware costs, reduced IT costs, and worry- free data backup are additional advantages of the cloud. The advantages result in improved efficiencies and saving in time and money.

The educational sector among other sectors and spheres of human endeavors seem to be slow in recognizing the numerous benefits a crewing from smooth migration to the cloud. But change is in the air, and it is imperative we key into this change if we must maintain our place as frontiers and pathfinders in this ever changing and rapidly evolving word of ours. However, in recent time, there is hope as we observe that the profession and professionals have seen the start of a great migration from client server software to the cloud. Educational technologists before now have been using cloud platforms to accomplish everyday tasks without knowing so, but most of these uses are observed to be outside the practice of education. However, there is hope that if more professionals are able to connect the dots and look to the numerous advantages of cloud, they would realize that they would be bringing greater accessibility and convenience into the practice with cloud applications.

Educational Implications Of Cloud Computing In Educational Technology

- Increased Collaboration by Removing Constants; Working in the cloud removes the constraint of location and time that may be currently hindering collaboration between team members dispersed through geographical divides. Cloud computing allows team members work from practically anywhere on the globe provided an internet connection is available. This fosters innovation as true collaboration occurs across the globe. Project teams can be brought together to share their knowledge, tapping on once remote expertise and drawing on their collective wisdom. This expertise may have been too niche or costly to engage prior to migration and adoption of cloud computing. The New Zealand ministry of education uses/ "ICONZ" which is Webvisions cloud based services to bring remote schools together and provide access to learning materials not otherwise available locally. Through interactive e-learning, students can learn from specialist teachers dotted around the country.
- Big data-driven decisions; The cloud can be used to process enormous amounts of raw (big) data. The cloud's elastic computing capacity can be applied to expansive data sets. Such data analysis can result in key insights and trends not yet apparent to many. Educational technologists can use the cloud to dig through big data, with the aim of learning students' preferences, hence delivery more relevant teaching experiences to them. The cloud gives educational technology researchers leverage which they can utilize informs such as interaction with wider range of world widely dispersed students, the resultant effect of this is the possibility of analyzing data that would've previously been too costly or even impossible. Big data analysis is really driving the next wave of cloud adoption. Clients, professionals and businesses see opportunities earlier, react and scale accordingly (Tabolt, 2015).
- Similar to collaboration information of professionals once held on local services, hard-drives, CD-Rom etc can now be shared across the institution and beyond. This can draw an insight leading to better decisions. Furthermore the cloud makes these insights available when and where they are needed. It allows educational t5echnologists and other educational professionals and decision makers, get relevant information at key decision making points, guiding processes and decision makers with automated analysis in real time.
- Increasing Agility; the scalability of cloud-based resources is already a well known characteristic of cloud computing. Institutions, schools, monitoring and regulating agencies can seamlessly handle unexpected demand spikes (or thoughts) at will, since they needed resources are readily available and are also virtual. Owing to scalability of cloud applications, new applications can be prototyped faster, gaining feedbacks and fail-faster, all at lower overall costs.

Educators and education policy makers, monitors, and those in charge of implementation need to realize the salient effect education has on sustainable national development. Education plays a key and vital role in positioning the government and the people to work towards achieving meaningful goals that culminate to sustainable development. What better way can education be repositioned in the face of rapidly evolving digital age than to adopt and promote innovative pedagogies in teaching and learning of which Fusing cloud computing techniques to education technology is a positive step.

LIMITATIONS OF THE STUDY

The study faced quite some limitations which included

- Time constraints
- Limited resources

The researchers however propose that this topic could be further worked on empirically to further expand the concept.

CONCLUSION

In a rapidly changing world, only those who change with the changing times stand a chance of reaping the

benefits accruing from technological innovations and evolutions. Cloud computing technologies present new ways of accessing and utilizing Information Technology infrastructures and services on a pay per use basis. Educational technologists are enjoined to key into the educational technological benefits of cloud computing in other to ensure efficiency and flexibility in their operations.

REFERENCES

A platform computing white paper, (2010). "Enterprise cloud computing".

Andy Jensen, (2015). "Cloud Adoption in a rapidly changing world". Dentistry Network.

Arnold .S, 2009. "Cloud computing and issue of privacy". KM world, PP 14- 22 Available at: www.kmworld.com.

Chigozie-Okwum Chioma, (2015). "Ensuring data security; a panacea for promotion of adoption of cloud computing techniques by enterprises, via development of an internet based online telephone directory: A case study of Etisalat Nigeria". A thesis submitted for the award of Master of Science in Information Technology, School of Science and Technology, National Open University of Nigeria.

ENISA, (2009). "Cloud computing: benefits, risks and recommendations for information security". Available:http:llwww.enisa.europa.eu/act/rm/files/deliverables/cloud-computing-risks-assesment (July .10.2010).

Global Netoptex Incorporated, (2009). "Demystifying the cloud. Important opportunities, Crucial choices". Pp4-14. Available at: http//www.gni.com.

I TU-Technology Watch report, (2012). "Distributed computing utilities". Gred &Clouds. Retrieved from www.itu.int/dms pub/itu-t/oth/23/01/T230/0000090001PDEE.

ICONZ, (2015). "Cloud computing- 3 advantages beyond lower costs". Auckland, New Zealand. Scoop Independent News, June 8th 2015.

J. Brodkin, (2008). "Gartner: Seven cloud-computing security risks". Available at: www.infoworld.com/d/security-central/gartner-seven-cloud-computing-security-risks-853

Jack Tabolt, (2015). "ICONZ-Webvisions", New Zealand Gm. Extracted July 2015.

Kuyoro .S.O., Ibekwe. F., Awodele .D., (2011). "Cloud computing security issues and challenges". International journal of computer networks, volume (3): issue (5).

Lumley, Ross. A, (2010). "Cyber security and privacy in cloud computing: multidisplinary research problems in business", the George Washington university, report GW-CSPR1-2014-4, December 18,2010, PP 1-10.

Magret Rouse, (2012). "What is cloud computing". www.whatis.com.

McKeown Rosalyn, (2002). " Education for Sustainable Development Toolkit, Version 2.0." Available from www.esdtoolkit.org. Retrieved 9/11/2016.

Marinos A, Briscoe G, (2009). "Community Cloud Computing". In: 1st International Conference on Cloud Computing (CloudCom), Beijing, China. Heidelberg: Springer- Verlag Berlin.

Mell. P., and Grance.T, (2009). "The NIST Definition of cloud from NIST information technology laboratory" :http//www.nist.gov/itl/cloud-def-v15, retrieved on July 2011 .

National Institute of Standards and Technology, (2011). "The NIST Definition of CloudComputing". Retrieved 24 July 2011.

National Teachers Institute. "Introduction to Educational Technology". Kaduna, Nigeria.

Radack Shirley, (2012). "Guidelines for improving security and privacy in public cloud computing". ITL Bulletin, March 2012."

Robyler, M.O., (2003). "Integrating Educational Technology into Teaching". New Jersey, Pearson Education, Inc.

Rowntree Derek, (1974). "Educational Technology in curriculum development". London; Harper & Row Publishers.

www.en.m.wikipedia.org
www.legrand.com
www.unece.org