CLOUD TECHNOLOGY: A CATALYST FOR EFFECTIVE ENTREPRENEURSHIP EDUCATION IN NIGERIA

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Abstract

Information technology plays a major role in organising and operating a business by any entrepreneur. Entrepreneurship involves the ability to be creative, innovative and taking risk as well as the capability to plan and manage projects to achieve the set objectives. Entrepreneurship education contributes to economic growth in developed nations. The financial crisis and the economic recession being experienced now in the country has really affected the entrepreneurs who operate Small and Medium Scale Enterprises (SMEs) in Nigeria due to inability to explore modern technology in their businesses. Therefore, there is need for cloud technology to be adopted as a powerful catalyst that would enhance job creation through entrepreneurship education. The potential for cloud computing to boost entrepreneurs as a platform for entrepreneurship education is significant. This technology can be adapted to support entrepreneurship education as it can be scaled over time to offer the required resources. Research has shown that cloud computing has played a catalytic role in boosting education in the world. Thus, the paper examined the potential benefits and issues involved in adopting cloud computing to support entrepreneurship education. It was concluded that the adoption of cloud computing would help to generate thousands of new jobs in Nigeria. It was also recommended among others that the National Information Technology Development Agency should organise workshops, seminars and training for existing entrepreneurs on the benefits of using cloud technology. Cloud technology should also be introduced as one of the courses in business education and allied fields.
Key words: Cloud computing, entrepreneurship education, cloud technology, entrepreneurship

Introduction

Information technology has permeated every aspect of life from technology to aviation, medical science and history. Education is not an exception despite the numerous challenges faced in integrating Information and Communication Technology (ICT) in the teaching-learning process. Education is among the fastest growing sector in the world, as such the needs and demands of education has no end. The application of ICT can enhance entrepreneurial competitiveness as well as providing genuine benefits for small and medium-sized enterprises, as such, encouraging competition.

Modern technology has helped various institutions in creating an open learning environment where education can be accessed by a vast number of people. The gradual

advancement in the IT world over the years has given rise to new computing paradigm which is known as "Cloud computing". The adoption of cloud computing in various higher institutions is not only aimed at reducing the universities' IT complexity and cost, but also to gain flexibility and agility through movement of sensitive data into remote data centres also known as the "cloud" (Mathew, 2012). The concept of moving applications and data to the cloud to enhance productivity, efficiency and mobility cannot be over-stressed.

Cloud technology offers many opportunities including digital learning as it can help organisations to enhance their businesses by using technology more efficiently. The application of cloud computing in education creates room for better research, discussion and collaboration. Cloud computing can be adopted to enhance learning in entrepreneurship education as it is a platform that can be scaled over time to offer the required resources. Cloud computing is suitable for entrepreneurs to acquire competitive skills due to its flexibility in time, place and content. Entrepreneurs have to be convinced that the application of cloud technology can help them to avoid too much proportioning of ICT infrastructures, hence reducing cost. This paper will highlight how cloud computing can be used to enhance entrepreneurship education, the potential benefits and challenges of implementing it in Nigeria.

Entrepreneurship Education

Entrepreneurship can be described as the art of being an entrepreneur. It is the engine that drives modern economy. Thus, some developed and emerging economies have adopted technology to fast-track the creation of new ICT driven enterprises due to its high percentage success rate in new venture creation. The resultant effects can be in the form of technology/knowledge transfer, employment generation and wealth creation. An entrepreneur is a person who is innovative, creative and a risk taker who has the ability to plan, manage and turn ideas into action in order to attain a certain goal (Hamburg, Bucksch and Brien, 2015).

Entrepreneurship education inculcates in students creativity, efficient problem-solving ability, and objective business idea analysis with the ability to communicate, cooperate, lead, develop and evaluate projects (Hamburg, et al., 2015). It enables students to start-up businesses after such ideas have been experimented in an educational and supportive environment. Though it supports starters in small businesses, it also enables new businesses create more jobs, contribute to development of the local community as well as providing a more conducive business environment. Entrepreneurship education covers a wide range of occupational skills and the students involved are expected to acquire various competences depending on their interest.

The successful implementation of entrepreneurship education in vocational education training and schools, requires structural changes in teaching and learning methods (Hamburg and Brien, 2014). Information technology can be used to influence entrepreneurship education as it has the ability to improve the competences and skills of the students, motivate and engage them, and also help them to link school knowledge with work practices. Researches have revealed some weaknesses associated with this programme such as limited teaching participation, inappropriate teaching methods, lack of competent teachers and lack of involvement of business people.

Definition of cloud computing

Cloud computing is a concept in which computing resources are delivered on-demand on a pay-for-use basis including applications and the data centres (Marston, Li, Bandyopadhyay, Zhang & Ghalsasi, 2011). In education, this entails having access to original software and other computing resources at any time irrespective of locations (Seleman, 2015). This development which can be experienced with on-demand scalability enables real time access to powerful web content.

Odunaike, Olugbara and Ojo (2012) described cloud computing as an abstraction and extension of the power of the internet and ICT using the concept of virtualisation to deploy resources, software, infrastructure, products, services, devices and database to customers on a pre-defined contractual basis. On the other hand, customers only subscribe to this service and do not have to invest on IT hardware infrastructure and software maintenance.

Cloud computing can also be described as a standardized IT capability, such as software app platform or infrastructure, delivered via internet technologies in a pay-per-use and self-service way (Staten, Schadler, Rymer and Wang, 2009).

The National Institute of Standards and Technology (NIST) (2011) described cloud computing as a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction (Mell and Grance, 2011). In other words, the resources are shared to provide the requisite quality of service, dynamically scalable, rapidly provisioned, virtualized and released with minimal interaction by the service providers. They also asserted that cloud computing has three different service models, four deployment models and five distinct characteristics.

There are two major categories of cloud infrastructures: internal and the external. Internal cloud involves the use of software resources, servers and the IT expertise within the school environment to build scalable infrastructure that meets cloud computing requirement. External cloud exists where IT support services and expertise are sold on-

demand to schools as a package by service providers. The institutions will have access to only those applications and services.

Models of cloud computing

Alghali, Najwa and Ismail (2014) categorised cloud computing into three different service models as follows:

Software as a service (SaaS): Blue-chip organisations like Microsoft, IBM and Google provide higher institutions with consistent experience across various devices. These service providers are responsible for the running and management of the product. Clients are allowed to access the software applications which are hosted in the "cloud" through the internet. The users have nothing to do with the maintenance and management of the underlying infrastructure but rather concentrate on the application of the software. The typical example can be seen in the management of emails in the higher institutions by Google. The institutions make use of the service without any idea about the maintenance of the servers and the operating systems used in providing the service.

Platform as a Service (PaaS): Cloud computing provides infrastructure to the clients It is a collection of software and infrastructure with other things required to build applications including programming and database software. The burden of managing the underlying infrastructure is handled by the service providers, hence enabling IT managers to concentrate on their core function of deployment and management of applications. This results in improved productivity as issues pertaining to software maintenance, patching, resource procurement and capacity planning are handled by the service provider (Tadapaneni, 2017).

Infrastructure as a Service (IaaS):This constitutes the fundamental building blocks of the cloud service which users are provided with the required computing power including the networking features, storage capacity, processing and virtual hardware (computers). However, the principle and management of the cloud is the sole responsibility of the provider. The required hardware are provided by the cloud service providers while the clients make use of the application software like the servers, technology, computation and the basic characteristic such as the operating systems and virtualization of hardware resources.

Deployment models of cloud computing

The deployment models define how the cloud can be accessed. These models describe the environment where cloud applications can be installed for users to access (Eken, 2014). There are four different deployment models of cloud computing (Alghali, Alwi and Ismail, 2013). These include private, public, community and hybrid cloud.

Private Cloud is a cloud platform meant for selected clients even though it can be managed within by the Network managers or externally by a third party. The cloud infrastructure is owned and exclusively used by a single organization (Gkikas, 2014).

Public cloud involves the provision of the IaaS, PaaS and SaaS by the service providers. These can be set up using a collection of shared physical resources which are accessible over the internet. The cloud services are offered to the general public for open use by organization who owned the cloud infrastructure (Gkikas, 2014). It is a situation where the cloud is made available in a pay-as-you-go basis (Armbrust, et al., 2009).

Community cloud involves sharing of the external private cloud by clients with the same need. It allows only the clients in the same community to have access to the platform provided by the service provider. The infrastructure is only shared with a specific community consisting of organizations that share common interest (Gkikas, 2014).

Hybrid or Enterprise cloud is the combination of both the internal providers and external providers where part of the cloud is private and can only be accessed internally while the other part is public to be accessed externally (Eken, 2014; Alghali, et al., 2013).

Cloud Computing to Support Entrepreneurship Education

The implementation of cloud computing service in entrepreneurship education will allow institutions to make use of various internet resources for data analysis and storage while carrying out research. The gains of this service cannot be over-stressed. It enables availed institutions access to real-time information regardless of location within a short time (Seleman. 2015). This would give the teachers and students easy access to updated information relating to their area of specialty. It also provides teachers and students easy access to relevant applications and tools that can facilitate the execution of quality research.

The advent of this new technology if correctly implemented will result in unprecedented cost-efficiency, scalability, elasticity and reliability. The adoption of cloud services will expose entrepreneurs to numerous opportunities which allow them to compete in an innovative ICT environment as well as giving a level playing field required for success in business (Hamburg and Brien, 2014).

The major characteristics of cloud computing which are also useful for entrepreneurship education according to Hamburg and Brien include:

Wide Network Access

The users can access the available resources over the network using different platforms. Then educational institutions can improve their communication using this feature to collaborate with one another on any matter of interest. Computing resources

can be accessed using the internet from a wide range of devices including smart phones, tablets and laptops.

On-demand self-service

Cloud users have uninterrupted access to computing facilities with direct access to infrastructure including server time, storage, software and content without any human interaction with the service providers. It allows students and administrative personnel quick access to different application platforms and resources through the internet on-demand (Ercan, 2010).

Resource Pooling

The cloud users (students) do not have any idea over the exact location of the resources which are pooled to serve them. Resources which are shared between users can also be allocated dynamically on demand (Sclater, 2010). Hardware components can be replaced without any effect on the performance. These may include the servers, virtual machines, network bandwidth, storage, memory and processing.

Rapid elasticity

It offers entrepreneurs the ability to scale up and down computing capacity at any time they want and can also be done automatically according to the demand (Gkikas, 2014).

Measured service

It offers tools for proper monitoring, controlling and means of reporting the use of resources, hence providing transparency for both the provider and user of the utilized service.

Benefits of Cloud Technologies in Entrepreneurship Education

The adoption of cloud technology has brought many benefits to entrepreneurship educations which include:

Cost reduction

Cloud computing offers opportunity to reduce the amount of money expended on IT. It reduces the cost of software, hardware, networking, storage, electricity, cooling and space to accommodate the hardware (Gkikas, 2014). Institutions of learning save the cost of new computing equipment. It also minimizes the cost of database administration, OS upgrades, software license, frequent contracts, consulting companies, IT staff, testing and new application piloting (Alghali, et al., 2014).

Pay per use

Though users of the cloud services can have unlimited access to resources, they will only pay for what they have used while the providers bear the costs of hardware and software (Sclater, 2010). Users are charged using fee-for-service or advertising to promote optimization of resource use (Alghali et al., 2014).

Availability

It also provides a high level of resource availability. Yadav (2014) opined that constant availability of this service without failure is mostly desired by the users who can access from anywhere. In cloud computing, system with issues can be automatically detected and removed without any effect on other users system.

Support

In cloud computing, since the hardware and software are provided by the service providers, their maintenance are also taken care of, hence less problems for the entrepreneurs (Alghali, et al., 2014).

Inexpensive textbook

Several students refused to buy textbooks because it is an established fact that textbooks are expensive. The cost of textbooks outpaced that of other things in education. Cloud-based textbooks can help in salvaging the situation as electronic copy is less expensive than hard copy.

Updated teaching materials

This technology has made it easy for learning materials to be updated in real time, thus giving students access to the latest learning resources in entrepreneurship.

Expensive hardware not required

No special hardware is required. The students can access the applications using smart phones, TV, laptops. There is no need to acquire external storage device as IT companies such as Google, IBM, and Microsoft do offer free cloud-based storage.

Expensive software not required

Cloud-based software are either available for free or on a low-cost subscription basis resulting in lower cost of essential applications for students. The purchase of an expensive single Microsoft office license can be replaced with a cloud-based subscription for five computers and 5 mobile devices for a minimal fee. The students can also use Google Docs for free. The universities can save a lot by adopting SaaS applications.

Wider reach to more diverse students

Cloud-based technology opens up a world of new opportunities for students including those who were not served properly in the traditional education system. It

creates opportunities for matured students who could not complete their education to earn their diploma certificate.

Developing Entrepreneurial Skills Using Cloud Technology

The main objective of entrepreneurship education is defined by the intended outcome followed with training efforts that enhances the development of entrepreneurial skills using applications that will promote job productivity, effectiveness and performance in an organisation (Larry and Best, 2011).

The development of entrepreneurial skills is one of the aims of adopting cloud technology which provides diagnostic insights into small business innovation. The resultant effect of developing entrepreneurial skills on small business innovation can be in form of number of innovations transferred, total funds invested in innovation projects and improved time to market for new innovations (Amue, Igwe and Abiye, 2014). Thus, the adoption of cloud services by entrepreneurs paves way for small business innovation.

Cloud-based Entrepreneurship Development

Research has shown that the use of appropriate ICT infrastructure, technical skills and user time by any organisation contribute to their successful entrepreneurship development (Amue, et al., 2014). In other words, organisations with high levels of technological capability have the tendency to be innovative and creative. Thus, entrepreneurs can avail themselves of enormous opportunities offered through cloud services to create more effective processes, products and ideas that can increase the likelihood of success in any business.

The application of cloud technology in entrepreneurship education can help create more efficient work processes that can enhance performance leading to improved productivity. Thus, serving as a catalyst for the growth and success of the business by creating an environment that promote innovative thinking and creative problem solving. Cloud-based technology, as an ICT infrastructure, provides a platform upon which e-commerce is built for business to thrive (Amue, et al., 2014). This service which requires constant internet access would also give room for development of internet skills and technical know-how needed for the development of entrepreneurial applications.

The Challenges of Cloud Computing in Entrepreneurship Education

The implementation of Cloud technology raises lot of sustainability concerns and challenges that threaten this innovative technology. Some of the challenges that could hinder the adoption of this service in entrepreneurship education include:

Reliability:

It is one of the greatest concerns for educational institutions adopting cloud services. A greater number of cloud service providers abroad may not be ready to offer

resources such as technical support and bug fixes, to small markets in the third world countries (Alghali, et al., 2014).

Security and privacy

Data security is a major concern for the adoption of cloud technology. Over the years, many institutions believe in hosting their data within the institution for security reason. Thus, transferring data to an organisation for hosting in a remote data centre which may not be known is still seen as a risky venture. This may involve storage of peoples' data on different shared servers, hence discouraging organisations with sensitive data from adopting cloud computing technologies (Gkikas, 2014). Cloud providers now give guarantees in their contracts that personal information will be stored in particular countries.

Unsolicited advertising

The cloud providers will always send unwanted email to advertise their products (Sclater, 2010). Although this is illegal in some countries, institutions should endeavour to prevent it as there are high penalties for any of such breaches.

Vendor lock-in

This is a situation where an institution is "locked-in" to the products of a particular provider (Sclater, 2010). This is of great concern because of the difficulty involved in changing cloud providers. Though switching cost may not be affordable, but moving in and out of a cloud provider is difficult to achieve.

The risks outlined above are real and they may be other ones that will emerge as services evolve. The risks can be managed and also outweighed by the numerous opportunities the cloud presents to rationalize IT expenditures, improve educational and administrative services, and make institutions more agile and creative places.

Conclusion

The paper has shown cloud technology as a powerful catalyst for job creation through entrepreneurship education. Although the higher automation and efficiencies of the cloud might result in loss of lower-skilled jobs, the adoption of cloud computing can help to generate thousands of new jobs in Nigeria.

Cloud computing can be seen as a lee-way to help Nigerian entrepreneurs who are innovative to set up business without investing a lot of money since most of the things they need will be available online (on the cloud). This technology has the potential to lower the risk of entrepreneurship to a great extent and can possibly attract more partnership amongst potential investors. Cloud computing will offer students and trainers the opportunity for quick access to different application platforms and other educational resources through the internet on-demand. This in turn will lead to cost saving for the organisation while allowing more functional capabilities.

The implementation of cloud technology requires some modification in the curriculum of entrepreneurship education including the people with special knowledge involved in the training. There should be conducive environment suitable for group discussions and the libraries containing references where students can research on cloud computing issues. This paper presented cloud computing as a socio-economic driving force of entrepreneurship development through cost effective operations as against the conventional methods.

This service would be of great value to institutions offering entrepreneurship education in terms of taking away the burden of IT infrastructure maintenance, providing instant global platforms, cost reduction, elimination of software updates, licences as well as simplified scalability. The adoption of cloud technology in entrepreneurship education will also eliminate the high cost and risk involved in disaster recovery. Though there are still some challenges mitigating against its implementation; security service level-agreements and application offerings, it advantages still outpaced the weaknesses.

Recommendations

1.   The National Information Technology Development Agency should organise workshops, seminars and training for existing entrepreneurs on the benefits of using cloud technology.
2.   Cloud technology should also be introduced as one of the courses in business education and allied fields.
3.   The federal government should encourage entrepreneurship education using cloud technology for the strategic position of cloud-based entrepreneurship development in economic building.
4.   The media should be encouraged to promote the emergence of local role models who adopt cloud computing using entrepreneurship education.
5.   The cloud providers should improve their interaction with entrepreneurs who are involved in the cloud computing experience, in an effort to create a healthy environment for cloud technology adoption, and to remove any vagueness surrounding the technology.

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