

The Place of Cloud Computing in Adult Education: Implications for School Administrators

Uju A. Nwobi¹, Angie I. Oboegbulem², Chijioke J. Olelewe³,
Felicia O. Mbagwu^{1*}, Felicia Iremeka², Uche C. Asogwa², Ifeyinwa O. Ezenwaji²,
Iro S. Uwakwe², Bartholomew Nwefuru² and Samuel C. Ugwoke²

¹*Department of Adult Education & Extra-Mural Studies,
University of Nigeria Nsukka*

²*Department of Educational Foundations, University of Nigeria Nsukka*

³*Department of Computer and Robotics Education, University of Nigeria Nsukka
mbagwu.felicia@gmail.com

Abstract

In this paper, the authors argued that the realisation of some educational objectives can be made possible through the adoption and implementation of cloud computing. Thus, an attempt was made to examine the relevance of cloud computing in adult education setting. Cloud computing has application programming interfaces which promote educational functionality among students. Overall, from the reviewed literature, cloud computing seems to be a vital technological platform for learning by adult education students. Government and relevant educational agencies are urged to support the integration and utilization of cloud computing in adult education programmes. The implications of cloud computing for educational administrators were discussed in this paper.

Keywords: *Adult education students, Cloud computing, education, school administrators*

1. Introduction

Advances in information and communication technology (ICT) such as data mining, interactive whiteboard, flipped learning, social networking sites, cloud computing among others, have necessitated the need for its adoption in higher education setting. Cloud computing builds infrastructure, platform and software services which may enable students of adult education class to improve more than expected. Akinsola *et al.*, (2005) was of the view that infrastructure and service is the Internet strength: e-education, online access and functions, better recital, storage and power can be achieved. Poor infrastructure and service regarding cloud operations centers on government neglect to education responsibilities. This has no doubt hampered the use of ICT facilities and services in Nigerian educational institutions (Akinsola, 2005). According to Boit *et al.*, (2012), developing countries' education can only be compared to the developed countries' if the government can improve the implementation of innovative technological tools and resources in education. Childs (2009) was of the opinion that adult education classroom for teaching and learning can only improve with the implementation of ICT platforms. The author added that technological innovations like the use of smartphones, learning management systems among others is adding value to classroom learning, especially for adult learners.

Received (January 25, 2018), Review Result (May 10, 2018), Accepted (May 16, 2018)

* Corresponding Author

According to Kshetri (2010), the remedy to some classroom-related issues in Nigeria is cloud computing. Vujin (2012) stressed that cloud computing makes the use of the Internet to enable students to access current information relating to their field of study. Adesoji and Olatunbosun (2008) opined that cloud computing will facilitate adult education teaching and learning. It is imperative therefore for adult learners to have access to the Internet since it boasts the use of cloud computing in the school setting. Cloud Readiness Index (2011) stated that cloud computing would facilitate educational attainment in Nigeria since Nigeria is rated highest on Internet strength in Africa. This paper aims to promote the use of cloud computing in Nigerian adult education programme.

2. Cloud Computing

There is no generally recognized description of cloud computing. A more commonly used definition describes it as clusters of distributed computers (largely vast data centers and server farms) which provide on-demand resources and services over a networked medium (usually the Internet). There are three main types of services that can be offered by the cloud and they include, according to Sultan (2010);

- Infrastructure as a Service (IaaS): Products offered via this mode include the remote delivery (through the Internet) of a full computer infrastructure (*e.g.*, virtual computers, servers, storage devices, *etc.*);
- Platform as a Service (PaaS): To understand this cloud computing layer one needs to remember the traditional computing model where each application managed locally required hardware, an operating system, a database, middleware, Web servers, and other software. One also needs to remember the team of network, database, and system management experts that are needed to keep everything up and running. With cloud computing, these services are now provided remotely by cloud providers under this layer;
- Software as a Service (SaaS): Under this layer, applications are delivered through the medium of the Internet as a service. Instead of installing and maintaining software, you simply access it via the Internet, freeing yourself from complex software and hardware management. This type of cloud service offers a complete application functionality that ranges from productivity (*e.g.*, office-type) applications to programs.

Cloud computing makes online learning possible, thus, thousands of learners could be taught at the same time. Cloud computing is a learning arrangement in which students and teachers can both easily interact with a common understanding, store information for future use and access reliable resources with less cost using remote servers (Grossman, 2009; Voas & Zhang, 2009). Voas and Zhang (2009) further saw cloud computing as a group of hardware distributed in a classroom to provide students desirable learning. According to Hu and Zang (2010), cloud computing is a central information power provider with the help of Internet services. To these authors, cloud computing provides quality services for learners as its major sources of information depend largely on collection of information. The author further noted that cloud computing is of three service forms: infrastructure as a service, platform as a service and software as a service.

Cloud computing is an Internet group learning. According to Auer (2013), cloud computing is an Internet learning that avail group of learners the opportunity of balance of resources at the space of the learners' real time of needs. This informs that there are large numbers of people assessing the information but to one's space of time or as the need arises. Armstrong (2012) defined cloud computing as a network of computers used for transferring of knowledge which enables students to assess educational information in order to increase knowledge through Internet connectivity. Armstrong stated that as available resources for cloud learners grow, the operation automatically adjusts to the

demands, ensuring that students' encounter could be closely measured. Rozsnyai, Aleksander and Yurdaer (2011) saw cloud computing as a model for ensuring balance, convenient, on-the-time network access to share a pool of configurable network, storage, application and services that are beneficial to the users. Mell and Timothy (2011) stated that scalability and availability is the mandate of cloud computing. By this implication, developing countries and institutions of higher learning especially as it affects adult education needs cloud computing services to improve their day-to-day operations. In view of this, Ezenwoke *et al.*, (2013) stated that industrialized countries have initiated national cloud computing strategies in order to suppress learning difficulties experienced by adult learners.

According to Almajalid (2013), cloud computing is the application of hardware and software facilities which accommodate many users at a time. The author was of the view that cloud computing came as a result of increased use of ICT applications like laptops, smartphones among others. The author further maintained that cloud computing is of various forms which include public cloud for knowledge at public consumption, private cloud for internal services and service cloud. Leavitt (2009) was of the view that cloud computing is cheaper to operate educational services. The author added that cloud computing enables students to understand and relate through the Internet while handling educational and personal issues. According to Lakshminarayanan *et al.*, (2014), cloud computing encourages sharing and storing of quality research and different opinions among researchers. Dong *et al.*, (2009) noted that fundamental evaluation of education is high in cloud computing platform. According to Sultan (2010), students can learn from cloud technology as it can be built to offer e-library resources. Wang and Xing (2011) opined that cloud computing is an educationally quick and organized technology for learning.

Also, many educational institutions have adopted cloud technology for the teaching and learning, including the University of California and the University of Westminster. Fox (2009) noted that the objective behind the adoption of cloud computing by these universities is for easy sending and mounting of course information for students and facilitate e-teaching and e-learning. Moreover, the position and importance of cloud computing cannot be overemphasized as long as there is an urgent need to integrate innovative learning approaches in adult education. Kurelovi *et al.*, (2013) were of the view that cloud computing has the capacity of transforming adult education by improving interface metaphors, balance reasoning and design encounter. The backwardness in education may be because few educational administrators uses cloud computing. In a study by Bittman (2009), only 12% of educators have recognized the emergence of cloud computing. On the contrary, Mallikharjuna *et al.*, (2010) stated that 88% of students and educators have shown interest in the use of cloud computing considering its importance and benefits for educational stabilization and individual intellectual growth and development.

Almajalid (2013) opined that cloud computing is a collaborative way of learning that accommodate both instructors and students in an economically viable manner, having no limitation in storing information, improving quality of thinking, giving access to information anywhere, and anytime. The author further stated that the 21st century students need technology to improve their learning standard. Also, the study by Gerald and Eduan (2012) investigating adoption of cloud computing in tertiary institutions in South Africa pointed out that the strength and hope for attaining educational objectives and goals in the current generation demands adoption of cloud computing at all levels of education. To Abdulsalam and Fatima (2011) cloud computing is the hope to reduction of learning frustrations in many developing countries of the world as it enhances and moderates teaching and learning.

Edtech (2013) held an interview with a panel of technologists, deliberating technological world of change in tertiary institutions particularly on cloud in education.

The technologists argued that all educational institutions need to adopt cloud computing for the benefit of improving teaching and learning. In this light, Anjali and Pandey (2013) and Sclater (2010) saw cloud computing as a mixture of three branches of delivery, growth and appliance platform. Cloud computing is expandable, easy, scalable and effective means that gives non-rigid, everywhere and anytime access to a shared knowledge. It offers shared communication and ideas, self-opportunity, and services within group learning. It is also the height of difference or change of flexible facility (Olabiyisi, Fagbola & Babatunde, 2012).

In the same vein, Oyeleye, Fagbola and Daramola (2014) conducted a study on the impacts and challenges of the adoption of cloud computing by public universities in the Southwestern part of Nigeria, with the resolution that clouds computing has positive contribution of cost efficiency, increased accessibility, resolves ICT difficulty; increased activeness and limits education physical investment. Cloud computing improves more conventional direction in the manner teachers and students can be assisted over the Internet. It works in form of smartphones, television and other relevant ICT tools that help to facilitate information dissemination and storage. This technological educational innovation has a link for building and maintaining sustainable education. Because of its services, many countries are gradually shifting their formal style of teaching and learning to conventional means including United States of America, the United Kingdom, among others.

Cloud computing is relevant to both students and teachers. Reza *et al.*, (2014) stated that cloud computing avail students and teachers the opportunity to control or manipulate massive equipment in order to do varieties of jobs at a less cost, offers real space association, coordinating course facilities, and offers easy learning on how to analyse scientific datasets. Several scholars have reported the following areas where cloud computing play significant roles in restoring and maintenance of quality teaching and learning of adult education: individualize learning for students; quick response to students' questions; distributing of learning materials to students easily; enhanced way of managing information; storing and sharing information and help students with problem-solving skills; collaborative learning, among others (*e.g.*, Carpinelli *et al.*, 2008; Grossman, 2009; Oyeleye, Fagbola & Daramola, 2014; Reza *et al.*, 2014; Tell *et al.*, 2000; Wischow *et al.*, 2009).

The use of Cloud computing is a technological innovation in education. Carpinelli *et al.*, (2008) argued that educational learning can survive better if students will be exposed to embrace educational innovation. Wischow *et al.*, (2009) noted that cloud computing would improve adult education learning since students can be given the opportunity to collaborate and share knowledge while learning. Tell *et al.*, (2000) noted that teachers as facilitators of learning need to be technologically oriented to enable them to engage learners in a most efficient manner. For example, teachers' inability to implement innovative teaching in the classroom stems from the fact that majority of them lacks relevant ICT skills (Olelewe & Okwor, 2017). While Rothman *et al.*, (2002) pointed out that real standard lesson focuses on students' academic achievement, O'Shea and Kimmel (2003) supported the above view that cloud computing will continue to give students an opportunity to improve their knowledge and be eager to impact such to other generation.

Cloud computing has application programming interfaces which enable students to attain educational functionality (Erenben, 2009). Chappell (2003) stated that students can be provided with better knowledge of computers and other related hardware and software information to enable them make use of the cloud. Apart from education, other fields of human endeavour utilize cloud computing information and resources for capacity-building (Weinhardt, Anandasivam, Blau, & Stößer, 2009). Raimi (2002) asserted that poor classroom learning is limiting development but can only advance if classroom teaching and learning can be implemented using cloud computing since it can help to solve poor laboratory, poor teaching method, examination malpractice, class size, among

others. Angyaye (2007) maintained that practical courses target student's basic knowledge and can be further fostered with the help of cloud computing. Furthermore, the author argued that this learning platform among adult students will give them the privilege of acquiring meaningful learning and gaining required skills and aptitudes that will make them not only to secure work but to contribute meaningfully to national development.

Cloud computing requires Internet connectivity. Monaco (2012) saw cloud computing as a combination of hardware and software to send information to over hundreds of people with Internet assistance. Monaco was also of the view that learners assess the opportunity at their comfort as long as they have data and can easily share views and opinions with each other without interaction from any instructor. Cloud computing as the current and most developing trend in education has a lot of contributions to development, particularly, stabilization of adult education as a programme of study. Cloud computing will enable adult students to assess new trends in teaching and learning at a considerable rate. Considering the importance of cloud computing, adult learners and educators need to understand the relevance of cloud computing and prepare for its adoption. Evans (2009) investigated the secret behind United Kingdom adoption of cloud computing and reviewed that 65% of respondents were of the views that cloud computing reduces cost. The Washington State University's School of Electrical Engineering and Computer Science (EECS) embraced the world of cloud computing because it was considered to be cost effective. The EECS believed that cloud computing offers easy and accessible education to students and staff (DeCoufle, 2009).

The use of cloud computing may help to address the challenge of poor funding of education in developing countries. Most countries of the world, especially developing countries, are still battling with poor educational funding (Grimston, 2009). Considering the attached benefits of cloud computing in education, researchers recommended the use of cloud computing (Fox, 2009; La Susa, 2009). In 2007, Google and IBM pointed out that computer science and other science courses need cloud computing in order to key into the innovative trends in teaching and learning. In the same light, the National Science Foundation (NSF) (2009) awarded \$5 million in grants to fourteen universities through its Cluster Exploratory (CLuE) programme to facilitate Cloud initiative. Erenben (2009) added that Cloud computing helps to improve classroom learning where science students, for instance, are inquisitive to know different chemical substances, how they react when combined and its effects on the environment.

Cloud computing has contributed in promoting the attainment of educational outcomes as well as fostering the availability of educational resources (Erenben, 2009; James & Hopkinsons, 2009; Katz, 2008). Today, several African countries are now advancing their educational landscape through Cloud computing in a bid to ensure the realization of sustainable development goal no. 4 which seeks to achieve inclusive and quality education for everyone and advance lifelong education (United Nations, 2016).

3. Adult Education and the Application of Cloud Computing

Adult education is a fast-growing discipline which aims at building knowledge among her learners. Adult education contributes to the scientific and technological development and industrialization of any nation if properly implemented (Adesoji & Olatunbosun, 2008). Erenben (2009) noted that the workability of educational classroom is dependent on the utilization of cloud computing. Thus, the teaching of adult students require the use of cloud computing. The intention for utilization of Cloud computing in adult education programme is geared towards improved quality learning among students. This implies that learning should not solely depend on one source, especially the traditional method of teaching and learning which is characterized by passive learning and teacher-centeredness, thus, can hardly benefit a greater number of learners. In order for adult

education students of Nigerian institutions to attain the global expectations, they need to embrace the current trend of innovative technological advancement in classroom learning.

According to Jadeja and Modi (2012) and Foster *et al.*, (2002), the availability of hardware and software have given students and organizations the opportunity for increased knowledge sharing with the help of Internet. Irrespective of time and place, knowledge advancement and management of resources by students and other independent bodies is achievable owing to Cloud computing (Kertesz *et al.*, 2012). Therefore, cloud computing would be a proficient adult learning platform, considering the large number of students enrolment in adult education. Adult education students will be academically enriched if they are exposed to learn with the cloud technology. Thus, adult education students can stand a greater chance of gaining more knowledge through sharing of knowledge and overall assessment of their learning capabilities. The complexities associated with adult education classroom learning such as content coverage, high enrolment rate, students' special learning needs, dropout rates among others demands the adoption of cloud computing. According to Usman (2000), cloud computing will enable adult learners to articulate their own ideas and knowledge properly. Individualized learning can help adult learners become friendly users of innovative technologies like Cloud computing.

Many working adults prefer to use e-learning to get additional qualifications. Research on the implementation of e-learning in a cloud environment is one of the cloud services in adult education programmes. Studies on e-learning in the cloud environment have been carried out by several investigators like Chuang, Chang, and Sung (2011), Dong *et al.*, (2009), Vishwakarma and Narayanan (2011), Pocatilu (2010) and Ghazizadeh (2012). There are quite a lot of architectural cloud-based e-learning which have been proposed by previous investigators like the architecture proposed by Phankokkrud (2012), Wang, Pai, and Yen (2011), and Masud and Huang (2012). Phankokkrud (2012) proposed e-learning architecture based on cloud computing which consists of three layers: infrastructure layer, platform layer, and application layer. Infrastructure layer is a hardware layer that supplies the computing and storage capacity for the higher level and this layer, which is used as e-learning and software virtualization technologies, ensures the stability and reliability of the infrastructure. The second layer is Platform layer, this layer is a middle layer consisting middleware that is Web service. It is used for providing the learning resources as a service. This layer consists of two modules: item classification module (ICM) and course selection module (CSM). They are used for accessing the items from the item bank and selecting suitable learning content from the content database. The third layer is Application layer which is responsible for interface provision for the students.

The architecture of e-learning-based cloud computing proposed by Phankokkrud (2012) and Wang, Pai, and Yen (2011) consists of three layers, namely: infrastructure layer, middleware layer, and, application layer. The first layer which is infrastructure layer is employed as the e-learning resource pool that consists of hardware and software virtualization technologies to ensure the stability and reliability of the infrastructure. This layer also supplies the computing and storage capacity for the higher level. The second layer is middleware layer which focuses on providing a sharable platform consisting of two modules: CNRI's (Corporation for National Research Initiatives) Handler System Module and Metadata Transformation System Module. The final layer is application layer where cloud computing provides convenient access to the e-learning resources.

The architecture of e-learning-based cloud computing proposed by Masud and Huang (2012) consists of five layers. The First layer which is infrastructure layer is composed of information infrastructure and teaching resources. Information infrastructure contains internet/intranet, system software, information management system and some common hardware. Teaching resources stored up mainly in traditional teaching model and distributed in different departments and domain. The second layer is software resource layer which is composed of operating system and middleware. A variety of software

resources are integrated through middleware technology to provide a unified interface for software developers to develop applications and embed them in the cloud. The third layer is resource management layer. In order to effectuate on demand free flow and distribution of software over various hardware resources, this layer utilizes integration of virtualization and cloud computing scheduling strategy. The fourth layer is service layer with three levels of services namely, SaaS, PaaS, and IaaS.

The applicability of cloud computing is gaining more strength as about 90% of organizations including educational institutions are enjoying cloud computing as it offer them the several benefits like implementing e-learning and e-teaching. E-learning has been significant in Information and Communications Technology (ICT), especially to university students who utilize hers opportunities most. Therefore, the following can be considered as its usefulness to university education:

- It delivers knowledge to developing countries and it integrates many ICT capabilities in a noble cause.
- E-learning could dramatically increase access to education. It improves quality of education by accessing global academic resources and by offering training to academics.
- It also helps learners take an active role, work with their colleagues/instructors from a variety of locations.
- E-learning is believed to take a competitive advantage over the conventional methods due to the speed and efficiency of the Internet, especially in making announcements.
- It could be the dream for people with work or family commitments; due to the high flexibility in time and place it offers.
- E-Learning creates an interactive environment for teachers and students, as well as the opportunity for discussion and clarification of class content.
- It also enables educational institutions to target learners who are unable to participate in traditional-learning environments. The Internet provides a rich source of information with different perspectives in research, high speed and countless resources to improve student work and students can undertake group work through the collaborative groupware.
- E-learning also enables participants to choose the course scope, appropriate time, access up-to-date content and even customize it among others.

Liaw and Huang (2003) maintained that e-learning based on the summaries of its characteristics is a multimedia environment, incorporate several kinds of information and e-learning systems support collaborative communication, whereby users have total control over their own situations of learning; support networks for accessing information and it allows for the systems to be implemented freely on various kinds of computer operating systems. Deducing, e-learning is new environment for learning that is centered on electronic networks which allow learners in universities to receive individualized support and also to have learning schedules that is more suitable to them as well as separate from other learners. This facilitates a high interaction and collaboration level between instructors or teachers and peers than traditional environment for learning. E-learning in academics which is characterized by the use of multimedia constructs made the process of learning more active, interesting and enjoyable (Liaw and Huang, 2003)). The main constructs that have made e-learning the most promising educational technology according to Hammer and Champy (2001) and Liaw *et al.*, (2007) include service, cost, quality, and speed. E-learning refers to the use of information and communication technologies to enable the access to online learning/teaching resources. It provides complete on-line courses only whereas comprise web-supplemented and web-dependent services for the provision of educational and support processes.

It is apparent that e-learning can empower students at higher educational levels to acquire their education in while at the same time perusing their personal objectives as well as maintaining their own careers, with no need to attend is subjected to rigid schedule. E-learning is often promoted as providing flexibility in time and pace of study where learners are able to work at a time of their choosing and devote as long as they wish to the online activities. Such a teacher-centred view is mirrored by the student concerns about the amount of time needed to devote to online work and the changes required to their working patterns. There is evidence emerging that time is a primary concern for students engaged in e-learning and that they need to adapt and reconstruct their approaches to time management. Allan (2004) explored the experiences of 57 e-learners from three different professional development courses using questionnaires, discussion group postings and interviews. Analysis of the discussion postings found that time was of greatest concern to students at the beginning of the courses with the most spontaneous postings on the topic of time shortly after the course start. Through the interviews Allan explored how students reconstruct their approaches to time management at an early stage in their programme and go on to develop a range different time management strategies.

There appears to be a need for students to develop strategies for using their time more effectively in blended courses. In order to engage effectively in online work, particularly group discussions, students need to logon frequently and this requires a change to their usual study patterns. In that, students became aware that the online seminars required them to “get organised and to think extensively about the discussion on-and-off over a week, rather than making a one-off contribution over a short period of time in a face-to-face session” and using on-campus time differently. More so, students on blended courses gave examples of how they were using their on-campus time more effectively, particularly emphasizing using this time to meet in small groups with other students, and using the 20 minutes before lectures to check for course announcements and emails. Adult and young learners in the institutions of learning utilize their time and attained life goals easier in e-learning than in the traditional ways of learning in education. The number of courses online has vividly increased as a result of the attained benefits for both learners and universities and thereby may enforce the perception of students either positive or negative. The objectives of e-learning have been teacher- rather than student-focused, with an evaluative objective aimed at investigating the pedagogic worth of e-learning innovations. So wherever possible this review draws on blended learning contexts and gives precedence to those studies which allow the learners themselves to identify the key features of their experience and/or speculate on what they feel like. Some students’ especially in developing countries of the World may have negative/lower perception about e-learning since they have lesser time to interact with their lecturers. Taking a student-centred approach to the evaluation of the experience of blended e-learning supported by the Blackboard in a University may raise concerns around equality of access to the internet, printing costs, and low levels of ICT skills.

Eliciting learning experiences can also highlight a wide spectrum of individual perceptions which would be difficult to predict. Non-participation is a good example as it is of great concern to tutors and has been related to tutor-centred issues including the interaction communication patterns of moderators in online discussions (Rourke and Anderson, 2002; Jung *et al.*, 2002), the conservative pressure of the prevailing institutional context that may render innovations unacceptable to students and the role of assessment in course design. Studies of the student perception however show that opinion levels are due to factors as varied as issues around time and time management, access to a course site from home and work or lack of clarity about the task (Moore & Aspden, 2004). Importantly, the reasons may also be highly individual. For example, a student who dropped out of an online course which made use of online testing ‘out of protest’ because she felt the frequent, timed tests were unfair to her as a dyslexic student. Another

example from a long-term UK resident postgraduate student undergoing a personal crisis and withdrawing from an online discussion-based course because he felt his English writing skills were being exposed as too weak. Clearly it is near impossible to ascertain these learners' perceptions from their observable behaviour or actions and yet their experiences are valid and important.

4. Possible Challenges and Prospects of Cloud Computing for E-Learning

Collecting student perceptions frequently produce complex and contradictory findings as many will be of the position that e-learning is frustrating, stress, difficult to cope and network barriers in Nigeria context and among others. Mason and Weller (2000) report on a large scale and careful evaluation of student satisfaction from the UK Open University's dramatically successful T171 course: 'You, Your Computer, and the Internet'. The report is typical of many in the research literature in a number of ways. Despite careful data collection from a team of expert evaluators with more than 30 years experience of collecting information from distance-learning students, the evaluator describes her experience; "reading though all the feedback data from students and tutors is like standing at the apocryphal Spaghetti Junction and watching cars going every which way. Some students call for more group work; others want none at all. Some are disappointed in the course content; others find it the perfect marriage of both vocational and academic skills. Advice fumes the air." (Mason & Weller, 2000, p. 197)

This is typical of attempts to evaluate student satisfaction in that it takes experienced and skilled evaluators to be able to make any clear recommendations for course development and improvement. Some students in e-learning education uphold that online learning can be really inspiring and really frustrating. Discussions can be really involving and interesting as students read and relate to others' comments. Also, it appears that being an e-learner is an emotionally charged skill. Teachers are often concerned with isolation and alienation. There are reports of initiatives which attempt to reduce these feelings through, for example, web-logs with teacher education students when asked specifically about working online, students are more likely to refer to feelings of frustration and there is wide variation in the elements of the course which might result in such feelings. O'Regan (2003) interviewed 11 students studying online about the emotions which influenced their experiences and found frustration to be the "most pervasive emotion associated with studying online". Frustration could arise from a wide range of stimuli including trying to fit study into life, trying to navigate online resources, rambling online discussions, or materials being outdated. It seems that what caused the frustration for each individual is less important than the fact that it was experienced by every student at some stage, and for some, caused them to question whether or not to continue with the course. The impact of the emotional intensity of online learning in terms of withdrawal or failure is sufficient to warrant its further investigation. Students view e-learning encounter sometimes as being more difficult than they thought it would be. The teacher-centred view of developed e-learning has often been to check that students will have sufficient ICT skills to engage with the course. Student experiences however demonstrate the range of learning skills needed to work effectively online go beyond ICT skills. This is neatly illustrated by Baptista-Nunes and McPherson (2002) who describe their experiences of converting and running an information systems module in a blended format at Sheffield University. They found in their feedback that students were reporting concerns with posting comments online and go on to say, "Prior to delivery, the course team had not considered this would be problem, as these were MSc. in Information Systems students, supposed to be able to efficiently cope with ICT. Nevertheless, general technical proficiency is not synonymous with ability to learn online."

Similarly, social and psychological barrier are still paramount despite existing ICT skills. Participants had not realized the extent to which they would be asking to publicly expose their views, which left them uneasy. The danger is that as e-learning courses develop away from baseline course information and more towards social constructivism and collaboration in their underlying pedagogies, students will be expected to work publicly to a greater degree. The next and final section explores what this might mean for e-learners. Authors have promoted a kind of discussion between tutors and students because in tutorials, they do not really talk between themselves, rather students always talk to the tutor. Students may not be prepared for what transpired during those years of studying in that virtual classroom and their learning style and conceptual framework could have been challenged, and their pedagogical paradigm given a good shake.

Many e-learning developments have been based on social constructivist approaches which aim to change the roles of students and tutors in ways which are dramatic and obvious online. E-learning environments and activities designed around principles of social constructivism require students to create their own meaning from a variety of different perspectives. Students will be engaged in activities which focus on real world, authentic tasks and require collaboration with their peers. In case studies from courses based on notions of collaboration and peer learning, some report difficulty in moving students beyond interactions of socialization and information sharing or with engaging students in productive peer feedback (Ramsey, 2003). Other studies report that they are managing this successfully and these are starting to produce guidance for teachers around the role of the facilitator and the assessment of collaborative tasks (Macdonald, 2003). The synchronous type allows learners to discuss with the instructors and also among themselves via the internet at the same time with the use of tools such as the videoconference and chat rooms. This type offers the advantage of instantaneous feedback. The asynchronous mode also allows learners to discuss with the instructors or teachers as well as among themselves over the internet at different times. It is therefore not interaction at the same moment but later, with the use of tools such as thread discussion and emails, with an advantage that learners are able to learn at a time that suits them whilst a disadvantage is that the learners will not be able to receive instant feedback from instructors as well as their colleague learners.

Sweeney *et al.*, (2004) conducted individual interviews with 12 students who had participated in a blended course where some seminars were conducted face-to-face and some on discussion boards. Some students felt free to contribute without fear of criticism. "The idea of it was pretty good because it gives you a chance to speak out without being in direct contact with others and offending" whereas other students were concerned that having a written, permanent record made them feel more vulnerable. "People are going to look at it again and again, and then there are people from other tutorials who are going to look at it, and your name is beside it." Some students appreciated the shift in emphasis from tutor-led face-to-face tutorials to more collaborative discussions with peers online, whereas other students expected to have a 'model answer' from the tutor and were frustrated when it did not arrive.

Moreover, some students appreciated that working online allowed them to offer more considered responses; others expressed concern at the time needed to contribute effectively to online discussions. Some students can view the discussion board as hard work, requiring reflection and time whereas others viewed it as offering deep learning and freedom of speech. There are frequent reports from the professional development literature that online courses can result in participants engaging in collaborative learning. At Oxford Brookes University, the Online Tutoring course is a fully online professional development opportunity which brings together higher education teachers from across the UK for four weeks of intense discussion-based activity. The course is not assessed or accredited, yet participation and collaboration is achieved and evaluated positively by the majority of its participants. The following comment is typical: "I'm sorry to feel that the

intensity of thinking and writing of the past month is coming to an end. A big thanks to you all who shared the experience with me. Your contributions have really carried forward my thinking in ways you will never know. Indeed, a good deal of the current advice on e-learning has stemmed from research conducted with academic staff development within this emerging research, it seems possible that such extreme variations in student perceptions could be linked to students' understanding of their learning and the role of the e-learning environment and its activities within that. Moore and Aspden (2004) for instance, working with undergraduate students, reported that positive experiences with e-learning were strongly linked to students understanding why it is used and conversely negative experiences when students could not see the purpose of the online activities.

Ellis and Calvo (2004) carried out a quantitative study investigating the experience of engineering students undertaking a traditional course blended with some asynchronous discussions. They gave students three questionnaires to complete: the Course Experience Questionnaire, and two others developed by the authors assessing approaches to learning through discussions and conceptions of learning through discussions. They found that the differences in experience described by individual students were related to their perceptions about their learning as a whole and in particular their understanding of the role played by the different modes of discussion. It seems that students who are not aware of the nature of teaching and learning are not able to understand the teachers' intentions for the online and face-to-face modes and so are not able to engage in them in an appropriate way. They conclude: "It is not enough simply to provide opportunities for meaningful discussions: if the students are not aware of the purpose of the discussions, or they have negative perceptions of the learning context, then they are not likely to benefit from the discussions or perform well in the subject."

5. Conclusion

Many educational institutions have adopted cloud technology for the teaching and learning. This paper has pointed out that the realisation of some educational objectives can be made possible through the adoption and implementation of Cloud computing. In the educational setting, Cloud computing can help bridge the gap between learners and instructors through collaborative learning. The use of cloud computing may help to address the challenge of poor funding of education in developing countries. In summary, the benefits of cloud computing to adult education include but are not limited to: advancing adult learners' knowledge and skills in area of scientific and technological development; enabling adult learners and educators to access relevant information anywhere, anytime; promoting individualized learning among adults; making teaching and learning of adult education more interesting and interactive; giving adult learners ample time to think on new educational trend. In essence, the teaching of adult students require the use of cloud computing. If the government and relevant educational agencies will support the adoption and implementation of Cloud computing, adult learners will stand a chance of contributing their own quota to nation-building.

References

- [1] Y. G. Abdulsalam and U. Z. Fatima, "Cloud Computing: Solution to ICT in Higher Education in Nigeria", *Advances in Applied Science Research*, vol. 2, no. 6, (2011), pp. 364-369.
- [2] F. A. Adesoji and S. Olatunbosun, "Student, Teacher and School Environmental factors as Determinants of Achievement in Senior Secondary School Adult in Oyo State, Nigeria", *The Journal of International Social Research*, vol. 1, no. 2, (2008), pp. 13-34.
- [3] O. Akinsola, H. Marlien and S. J. Jacobs, "ICT provision to disadvantaged urban communities: A study in South Africa and Nigeria", *International Journal of Education and Development using Information and Communication Technology*, vol. 1, no. 3, (2005), pp. 19-41.
- [4] J. Anjali and U. S. Pandey, "Role of Cloud Computing in Higher Education", *International Journal of Advanced Research in Computer Science and Software Engineering*, vol. 3, no. 7, (2013), pp. 966-972.

- [5] A. Ezenwoke, N. A. I. Omeregbe, C. Ayo and S. Misra, "NIGEDU CLOUD: Model of a National e-Education Cloud for Developing Countries", IERI Procedia, vol. 4, (2013), pp. 74-80.
- [6] J. Boit, M. David and K. James, "ICT and Education: Enabling Two Rural Western Kenyan Schools to Exploit Information Technology", Journal of Emerging Trends in Educational Research and Policy Studies, vol. 3, no. 1, (2012), pp. 55-60.
- [7] P. E. Childs, "Improving chemical education: turning research into effective practice", Adult Education Research and Practice, vol. 10, (2009), pp. 189-203.
- [8] B. Dong, Q. Zheng, M. J. Qiao, Shu and J. Yang, "BlueSky Cloud Framework: An E-learning Framework Embracing Cloud Computing", LNCS, vol. 59, no. 31 (2009), pp. 577-582.
- [9] I. Foster, C. Kesselman, J. M. Nick and S. Tuecke, "Grid services for distributed system integration Computer", vol. 35, no. 6, (2002), pp. 37-46.
- [10] R. Grossman, "The case for cloud computing", IT Professional, vol. 11, no. 2, (2009), pp. 23-27.
- [11] Z. Hu and S. Zhang, "Blended/hybrid course design in active learning cloud at South Dakota", Intl. Arab Journal of e-Technology, vol. 8, no. 2, (2010), pp. 58-71.
- [12] K. Kurelovi, S. Rako and J. Tomljanovi, "Cloud Computing in Education and Student's Needs", MIPRO, (2013), pp.856-861.
- [13] R. Lakshminarayanan, B. Kumar and M. Raju, "Cloud Computing Benefits for Educational Institutions", Information Security and Computer Fraud, vol. 2, no. 1, (2014), pp. 5-9.
- [14] N. Leavitt, "Is cloud computing really ready for prime time?", Computer, vol. 42, no. 1, (2009), pp. 15-20.
- [15] S. O. Olabiyisi, T. M. Fagbola and R. S. Babatunde, "An Exploratory Study of Cloud and Ubiquitous Computing Systems", World Journal of Engineering and Pure and Applied Sciences, vol. 2, no. 5, (2012), pp. 148-155.
- [16] C. J. Olewe and A. N. Okwor, "Lecturers' perception of interactive whiteboard for instructional delivery in tertiary institutions in Enugu State, Nigeria", Journal of Computers in Education, vol. 4, no. 2 (2017), pp. 171-196.
- [17] C. A. Oyeleye, T. M. Fagbola and C. Y. Daramola, "The Impact and challenges of the adoption of cloud computing by public universities in the Southwestern part of Nigeria", International Journal of Advanced Computer Science and Applications, vol. 5, no. 8, (2014), pp. 13-19.
- [18] N. Mallikharjuna, R. C. Sasidhar and V. K. Satyendra, "Cloud Computing Through Mobile-Learning", International Journal of Advanced Computer Science and Applications, vol. 1, no. 6, (2010), pp. 42-46.
- [19] N. Sclater, "eLearning in the Cloud", International Journal of Virtual and Personal Learning Environments, vol. 1, no. 1, (2010), pp. 10-19.
- [20] N. Sultan, "Cloud computing for education: a new dawn?", International Journal of Information Management, vol. 30, no. 2, (2010), pp. 109-116.
- [21] J. Voas and J. Zhang, "Cloud computing: New wine or just a new bottle?", IT Professional, vol. 11, no. 2, (2009), pp. 15-17.
- [22] V. Vujin, "Development and implementation of e-education model in a higher education institution", Scientific Research and Essays, vol. 7, no. 13, (2012), pp. 432-1443.
- [23] B. Wang and H. Xing, "The Application of Cloud Computing in Education Informatization", IEEE, Transaction, (2011), pp. 2673-2676.
- [24] C. Weinhardt, A. Anandasivam, B. Blau and J. Stöber, "Business models in the service world", IT Professional, vol. 11, no. 2, (2009), pp. 28-33.
- [25] N. Sultan, "Cloud computing for education: A new dawn?", International Journal of Information Management, vol. 30, (2010), pp. 109-116.
- [26] P. Mell and G. Timothy, "The NIST definition of cloud computing", NIST special publication, (2011).