

ASSESSING EXTENT OF USE OF CLOUD COMPUTING BY ACADEMIC STAFF IN SAFEGUARDING THE TEACHING-LEARNING PROCESS FOR SUSTAINABLE EDUCATION

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Abstract

Generally, scholars have realized that technology enhance learning. As such, this study assessed extent of awareness and use of cloud computing technology by academic staff in safeguarding the teaching-learning process for sustainable education in Abia State. The descriptive survey research design was adopted for this study and simple random sampling technique (Hat and Draw) was used to proportionately select 105 and 35 academic staff from Michael Okpara university of Agriculture, Umudike and Abia State University, Uturu from a population of 161 and 59 respectively for 2019 /2020 academic session. The instrument for data collection was a questionnaire developed by the researchers and validated by three experts in instrument construction. Data analyses were done using Chi-square and t-test statistics. Results of data analyses showed that there is no significant difference between academic staff of the two institutions on the level of awareness but there is a significant difference on the extent of usage of cloud computing technology. It was recommended among other things that more sensitization for awareness and use be created within the institutions by the University administrations in view of the current global health challenge of Covid-19 so as ensure safety of staff and students.

Keywords: Cloud Computing, Safeguarding, Teaching-learning, Sustainable, Education.

Introduction

Most organizations are evolving in respond to the transformative impact of technology in our modern world. Education and educational services are easily assessed nowadays because Information and Communication Technology (ICT) is gradually erasing all borders. This laudable change is not only in the educational sector but cuts across business, politics, medicine, engineering, tourism, travels, law, banking, architecture and other sectors of the society (Gebremedhin & Fenta, 2015). As such, these days, the digitally literate professionals carry out most of their work in the comfort of their homes or cafés / shops since a good portion of their daily work schedule have moved from the confines of traditional office spaces to video conferencing meetings hosted via Zoom, Google Meet/ Google Classrooms,

Microsoft Team, etc. Cloud computing or cloud-based storage technology is the delivery of different services through the internet. It is an information communication system that makes it possible for individuals and organizations to save files containing vital information to a remote database instead of keeping them on a proprietary hard drive or local storage devices (British Educational Research Association, 2014; Gebremedhin & Fenta, 2015). Cloud-based storage resources include tools and applications like data warehouses, servers, databases, networking and software. It covers a wide range of areas of software and hardware which can be broadly categorized into Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS).

Infrastructure-as-a-Service (IaaS) entails the delivery of computational data and storage infrastructure through some form of service interface so that users can generally access resources on-demand by paying only for what they use. In other words, Infrastructure as a Service (IaaS) is a cloud computing service where enterprises rent or lease servers for compute and storage in the cloud. Users can run any operating system or applications on the rented servers without the maintenance and operating costs of those servers. Thus, one is able to bypass the cost and complexity of buying and managing physical servers and data centre infrastructure. In platform-as-a-Service (PaaS), the user access cloud resources through some higher-level platform interface by building on top of an existing IaaS offering or resources accessible only via the PaaS interface. It covers a wide range of service types from general value-added services on top of infrastructure clouds to highly advanced, domain-specific platforms. The Platform as a Service provider supplies the networking, servers, storage, operating system (OS), middleware (e.g. Java runtime, NET runtime, integration, etc.), database and other services to host the consumer's application while the Software-as-a-Service (SaaS) is software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted. Software as a service (or SaaS) is a way of delivering applications over the internet as a service. Thus, instead of installing and maintaining software, you simply access it via the internet thereby freeing yourself from complex software and hardware management.

Therefore, the cloud offers users on-demand self-service, ubiquitous network access, location-independent resource pooling, rapid resource elasticity, usage-based pricing, and transference of risk (Mell & Grance 2011). This phenomenal technological development has been attributed to computing and telecommunication convergence, ubiquitous mobile devices and the downward trend of broadband costs (Caytiles & Park, 2013; Adjei, (2017). It is also very appealing to users given the flexibility of on-demand and real-time access to information resources and the relief from the burden of storage management while exercising universal data access irrespective of the temporal or the spatial state of the user. There is also reduction in capital expenditure on hardware, software and maintenance cost (Mell & Grance, 2011).

Safety in the teaching-learning process is a topic of great discuss since the advent of Covid-19 pandemic. In the field of education, safety can be viewed as the acquisition of knowledge and skills for dealing with emergencies while still promoting creative learning. It involves providing necessary knowledge and precautionary moves so that possible accidents can be averted. Thus, using cloud computing to safeguard the teaching-learning process for sustainable education entails the use of online technology to create an equitable user-friendly environment in which teachers, students, researchers, parents and other stakeholders easily interface with education-related information without face to face contact ((British Educational Research Association, 2014). In other words, students can access and save learning materials on their personal servers and work from wherever there is internet connection without personal contact with the teacher or learning institution as the case may be.

Furthermore, the cloud also presents opportunities to share education research-related collaborations for sustainability beyond the social spaces (Barnes & Tynan, 2007; Lenhart, Purcell, Smith, & Zickuhr, 2010). As such, integrating ICT in general and cloud computing in particular into the teaching-learning processes for safeguarding and sustainability means educational resources, researches related to teaching and learning, facts and other educational information are saved in mediums such as the cloud or cloud-based storage technology where they can be retrieved and shared with other people around the globe as occasion demands. But how aware or knowledgeable are academics of Federal and State owned tertiary institutions of this technology particularly in the study area? Different scholars over the years have advocated for and done intensive research in cloud computing (Cartwright and Hammond, 2003; Lim, Sew, Hew, Wong & Shanty (2003); Herzig, 2004; Lim and Chin, 2004; Wang and Woo, 2007; Gulbahar & Guven, 2008). However, with the Covid-19 global crisis of late 2019 till date, it has become imperative that all stakeholders act more proactively in integrating this aspect of ICT into all spheres of the education system. Such integration will help teachers and students get necessary curricular support in difficult and different subject areas as well as other database information integral for smooth day-to-day functioning of the school system (Gulbahar & Guven, 2008, [Government Information Quarterly, 2020](#)).

In the study by Gebremedhin and Fenta (2015) which assessed teachers' perception on integrating ICT in the teaching-learning process carried out using 72 teachers of Adwa College, it was found that there is significant relationship between teachers' perception and the factors that encourages ICT usage. In the study, the researchers sought answers to the extent of teachers' software usage as well as other instructional tools or materials, preferences for professional development on information gathering and support, factors that encourage teachers' usage of technology, teachers' perceptions of self-efficacy as well as barriers faced by teachers when using ICT in the teaching-learning process. On the issue of hardware and software usage, the results showed that most teachers in the College were unable to use hardware in the teaching- learning process due to shortage of resources. As

such, a good percentage of the teachers were unable to use ICT as an instructional tool. In another study by Ghavifekr and Rosdy (2015) on using technology-based teaching and learning tools as well as facilities to replace traditional teaching methods carried out in Kuala Lumpur, Malaysia, it was found that integrating ICT enhanced greatly the effectiveness of both teachers and the students. This study which used questionnaire to gather data from a total of 101 teachers in 10 public secondary schools also found that professional development training programs for teachers also played a key role in enhancing students' quality learning. Furthermore, in the study by Sivakumar, (2016) on utilization of Cloud Computing Application with focus on describing the development of cloud computing application scale and verifying the extent of utilization of the application among postgraduate students, it was revealed that there is growing awareness of the application. The sample used for the study consisted of 100 postgraduate students in face-to-face courses and the researcher adopted survey method for the data collection while factor analysis and t-test statistics were employed in data analysis. From the fore going, it is obvious that researchers have carried out several studies on the application of Cloud Computing to the teaching-learning process as well as other fields of human endeavors. This study is a step towards adding to this wealth of knowledge.

In a contemporary teaching and learning environments, the topic of sustainability is inevitable. Sustainable education when effectively implemented at all levels of schooling is an education that emphasizes the need for a global change in thinking in the direction and nature of human development. It is a teaching-learning context that shapes the world of tomorrow because it will equip individuals and societies with creative, innovative and entrepreneurial skill for daunting life challenges (UNESCO, 2007; Ahunanya, Osakwe & Uche, 2010, Eluwa & Ihendinuhu, 2018). Put differently, sustainable education means that every learner is exposed to a teaching-learning situation that is anchored on modern instructional methods and every teacher is provided a work environment that supports healthy career growth, access to facilities and resources (both on-site and online) that enhance good work ethics and support sustained engagement in the system.

More so, sustainable education equally means that students and teachers are provided with opportunities to grow their potential through exposures to digital technologies that are easily accessible and widespread for new life opportunities. Cloud computing helps educational institutions provide human and material resources such as course experts, digital contents, virtual laboratories and interactive classes, facilitate research, share knowledge, establish collaboration, support user mobility and perform computationally intensive laboratory experiments (Odunaike, Olugbara, & Ojo, 2014). The study by Odunaike, Olugbara, and Ojo (2014) on mitigating rural e-learning sustainability challenges using cloud computing technology found energy and security as emerging sustainability issues in cloud computing applications to education. While the study by Adjei, (2017) revealed that some educational institutions have embraced a variety of cloud computing systems

in teaching, learning and for professional development purposes. Therefore, since there are documented evidence in literature reviewed that academics and researchers in some part of the world have signed up to cloud-based systems like Dropbox and Google Drive for collaboration and management of personal as well as corporate information of various degrees of sensitivity. And cloud based bibliographic systems, systems for data analyses as well as editorial services are also very popular among academic researchers (Adjei, 2017), it is necessary to have documented evidence of the extent to which academics and researchers of tertiary institutions have adopted this technology in the study area. Thus, this study was a quest to assess the extent of awareness and use of cloud computing by academics in safeguarding the teaching-learning process for sustainable education in Abia State, Nigeria.

This study assessed the extent of awareness and use of cloud computing by academic staff in safeguarding the teaching-learning process for sustainable education in Abia State. Specifically, the study:

1. Determine if there is difference in the level of awareness between Federal and State academic staff of Colleges/Faculties of Education on the influence of cloud computing technology in safeguarding the teaching-learning process for sustainable education.
2. Find out if there is difference between Federal and State academic staff of Colleges/Faculties of Education in their use of cloud computing technology in the teaching-learning process for sustainable education.

Hypotheses

Ho₁: There is no significant difference in the level of awareness between Federal and State academic staff of Colleges/Faculties of Education on the influence of cloud computing in the teaching-learning process for sustainable education.

Ho₂: Federal and State academic staff of Colleges/Faculties of Education do not significantly differ in their use of cloud computing technology in the teaching-learning process for sustainable education.

Methodology

A descriptive survey research design was adopted for this study carried out in Abia State in the South-Eastern part of Nigeria. This design was considered appropriate for the study because the researchers were interested in finding out and describing the characteristics of the target population around the phenomenon being studied without influencing it in any way. Abia is a state in the South Eastern part of Nigeria. The capital is Umuahia, and the major commercial city is Aba. It is located on latitude 5.4527° N and longitude 7.5248° E and bordered by the states of Enugu and Ebonyi to the North, Akwa Ibom to the East and Southeast, Rivers to the South and Southwest, and Imo and Anambra to the West. The State has one Federal University of Agriculture by the name Michael Okpara University of Agriculture located at Umudike and one State University by the name Abia State University at Uturu. There

is also a College of Education at Arochukwu. Abia includes oil-palm bush and tropical rain forest in its southern part and woodland savanna in its hilly north. Mineral resources available in the state include lead and zinc and this geographical space is mainly inhabited by the Igbo (Ibo) people. Abia State is one of Nigeria's most densely populated areas with a rich culture and history. A simple random sampling technique (Hat and Draw) was used to proportionately select 105 and 35 academic staff from Michael Okpara University of Agriculture, Umudike and Abia State University, Uturu from a population of 161 and 59 respectively for the 2019 /2020 academic session. The instrument for data collection was a questionnaire titled “Questionnaire assessing extent of use of cloud computing in safeguarding the teaching-learning process for sustainable education – “QAUCCSTPSE” developed by the researchers and validated by three experts in research instrument construction from the two institutions used the study.

The QAUCCSTPSE instrument has two sections – section A sought general information on the respondents while section B contains 18-items on use of cloud computing. It was trial-tested and Split-half method of determining the reliability of research instrument applied. A reliability coefficient of 0.78 was obtained after using Pearson Product Moment formula to calculate the index. The final version of the instrument was administered to academic staff in the two institutions.

Data collected were analyzed using descriptive statistics and the two hypotheses tested using Chi-square and independent t-test statistic. The results of data analyses are presented in Tables 1 and 2 respectively.

Results

Table 1: Demographic data of participants

Institution	Male	Female	Total
Federal	67	94	161
State	25	34	59

Source: Office of the Dean - College of Education (MOUAAU) and Abia State University (ABSU) for 2019/2020 academic session.

Table 2: Chi- Square analysis of the level of awareness of Federal and State academic staff on the influence of cloud computing in safeguarding teaching-learning for sustainable education

Institution	High Awareness	Low Awareness	n	Cal χ^2	Df	Crit χ^2
Federal	95(94.7)	10 (9.8)	105	5.30	3	5.29
State	31 (30.8)	4 (3.9)	35			
Total	126	14	140			

The result in Table 2 is the outcome of the 2x2 Chi- Square analysis of Federal and State academic staff on the level of awareness on the influence of cloud computing in safeguarding the teaching-learning process for sustainable education. The results revealed no significant difference between academic staff of the two institutions on the level of awareness on the influence of cloud computing technology in safeguarding teaching-learning for a sustainable education. In other words, academic staffs of both institutions are adequately aware of the benefit of Cloud Computing in aiding quality service delivery. As such, the null hypothesis is upheld.

Table 3:Independent t-test of mean difference in the use of cloud computing in teaching-learning between federal and state academic staff

Variable	N	Mean	Std. Deviation	t	df	Sig
Federal	105	42.30	10.233	8.301	138	.000
State	35	9.03	4.671			

From the results of independent t-test analysis, the t-value of 8.301 is significant at 0.05 level since the probability of 0.000 is less than 0.05. Therefore, the null hypothesis is rejected. The conclusion is that there is a difference between Federal and State academic staff in extent of use of cloud computing technology in safeguarding the teaching-learning for sustainable education. Therefore, the null hypothesis is rejected.

Discussion of Findings

The results revealed no significant difference between academic staff of the two institutions on the level of awareness but there is a significant difference in the extent

of usage of cloud computing technology in safeguarding the teaching-learning process for sustainable education. In other words, in two institutions, academics are adequately aware of the benefit of cloud computing technology in aiding quality service delivery however there is significant difference in the extent of usage. This study which examined the personal versus professional uses of cloud computing systems by academic staff found that there is general mental awareness of the application but sparing usage by the respondents.

This finding is in line with Odunaike, Olugbara, and Ojo (2014), Ghanem, (2019) but contrary to the finding by Adjei, (2017) whose result showed that some educational institutions have embraced a variety of cloud computing systems in teaching, learning and professional development purposes and most of them have signed up to cloud-based systems like Dropbox and Google Drive for collaboration and for managing personal and corporate information of various degrees of sensitivity.

Conclusion

The outcome of this study indicates that there is the need to raise the awareness level among stakeholders of educational institutions on plausible prospects of using cloud computing technology to enhance service delivery since it enhances cost-effective and scalable ICT growth that aid organizational service delivery in all sectors. Thus, in this technology driven era, administrators of educational institutions should proactively adopt and use simple technologies such as cloud computing so as to enhance the teaching-learning process. More so, to share research findings, academic innovations and make more impact through providing requisite capacity training programmes for staff and students.

Recommendations

1. Administrators of educational institutions should provide facilities for more effective integration of cloud computing technology into the teaching-learning process because such integration will enhance, improve and guarantee safety of all stakeholders in view of the current global health challenge of Covid-19.
2. More sensitization for use of the technology should be created within the institutions for sustainable teaching-learning process and the education system in general.
3. The University administrations should organize training workshops to capacitate staff and students for increase adoption of the technology so as to ensure safety and sustainability in the education system.

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