

Evaluation of the Usability and Challenges Facing the Adoption of Online Based Cloud Services in National Open University of Nigeria, North Central Zone

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Abstract - This paper evaluates the usability and challenges facing the adoption of online based cloud services in National Open University of Nigeria, North Central Zone. To achieve the objective, this study raised four research questions. The study adopted cross-sectional survey design. Results from the study showed that the most adopted online based cloud services in NOUN study centres is email and majority of staff and students don't use the online based cloud storage services. Only few of them were found to be using storage infrastructure. Also, only few have ever come across any Online Cloud Collaboration Solution, Virtual Office Online Suite Solutions and Online Extra Processing Power. The percentage of awareness of the usefulness of online based cloud services at NOUN study centres was found to be low. It was observed that lack of internet connectivity, network fluctuation, poor knowledge of online cloud services by facilitators and students, malfunctioning of cloud services hardware facilities and non-availability of cloud services packages are impediments to usage of online based cloud services in NOUN study centres. The restructuring of curriculum in a way that cloud computing and its numerous benefits and opportunities should be effected in NOUN; adequate and constant availability of internet network connection should be provided by management; employing the services of professionals and constant orientation of facilitators and students on new developments in cloud computing was also recommended.

Keywords: Cloud computing, ICT, digital literacy

INTRODUCTION

Internet based computing where different services such as servers, storage and applications are delivered to an organization's computer and devices through the internet allow instructors to deliver learning in variety of ways. The application of Information and Communication Technology (ICT) is a powerful tool for the management of information and has helped in shifting the role of the tutors from that of sole information provider. It has brought about radical change in existing school practices and has become a veritable vehicle for service delivery in distance learning. ICT can be applied in several ways in distance learning to bring about far-reaching service delivery. Edafiogho [1] listed some of these ways as: e-learning, online learning, information literacy, digital literacy, digital virtual library, assessment.

According to Edafiogho [1] e-learning is flexible learning using ICT resources, tools and applications, focusing on interaction among tutors, learners and the on-line environment as well as on collaborative learning. On-line learning refers more specifically to the context of using the internet and associated web-based applications as the delivery medium for the learning experiences. Information literacy is the ability to locate, evaluate, manipulate, manage and communicate information from different sources. As learners become increasingly information-literate they develop skills in discrimination, interpretation and critical analysis. ICT offers opportunities for higher-order thinking and creativity in processing, constructing and conveying knowledge. Digital literacy is the ability to appreciate the potentials of

ICT to support innovation in industrial, business, learning and creative processes. Learners need to gain confidence, skills and discrimination to adopt Information and Communication Technology (ICT) in appropriate ways as literacy and numeracy. Virtual library is also called e-library or digital library. It makes library services available from and to any part of the world, hence it is called library without walls. This helps in providing information across towns, countries, and continents using digital technologies.

The next intervention of technology into learning was the internet. It was initially developed in 1961 for the military in project ARPANET (Augmentation of the internet) to assist them in command and control of battle fields all over the world. The barriers between school and the outside world are collapsing as people make direct contact in a form which masks their age and presents them as virtual equals [2]. Larger portions of college degree course work are being delivered via the internet. This system has bolstered the opportunities for real-time training. Furthermore, business is utilizing the internet to deliver everything from management development, mandatory training and professional continuing education. While it has been widely accepted in the adult education arena, it has not been a “major player” in the delivery of primary education.

The challenges that are faced by higher education institutions, National Open University of Nigeria inclusive are the ever changing environment, economical issues and the requirement to reduce the operating cost to remain competitive. Cloud computing provides services that are easily configured, deployed, dynamically-scaled, and managed in virtualized environments. It provides the foundation and capabilities for the dynamic infrastructure through a consumption and delivery model for services in which the user sees only the service and has no need to know anything about the technology or implementation. Cloud computing has a significant placed in the National Open University of Nigeria because appropriate use of cloud computing tools can enhance engagement among students, educators, and researchers in a cost effective manner.

These factors among others, including the determination of the level of facilitators and students awareness of the usefulness, usability, challenges and constrains facing the adoption and usage of online based cloud service in NOUN study centers formed the basis of this research.

The technology behind e-mail and much of what is done on the internet is something called cloud

computing. According to Armbrust, Griffidi, Joseph, Katz, Konwinski and Zaharia [3], Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the data centers that provide those services. The services themselves have long been referred to as Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). Basically, cloud computing lets you share and access programs like Microsoft Office, Skype, and Blackboard, for example, without downloading and keeping them on your computer. As long as you are online you have access the programs. Often, in the case of documents, you can edit and share documents through the cloud, which is like trading papers, working in groups, or handing in assignments in a traditional class. From the internet organizations, developed e-mail system enhances communication. E-mail has been defined as the medium of communications that send and receive messages by computer, over network cables and phone lines [4]. With the advent of e-mail systems, organizations were provided with an opportunity of one-way instruction as well as two-way and interactive learning opportunities. E-mail begins to personalize the experience for participants and builds defined e-learning on the learner-instructor connection [5]. The internet has become a viable delivery method for distance learning in NOUN. All of these technologies can be used independently or in various combinations to provide high quality learning to students at NOUN.

OBJECTIVES OF THE STUDY

The purpose of the study is to evaluate the usability and hence the challenges facing internet based cloud services in National Open University of Nigeria in North Central Zone. This study aims to investigate the extent to which online based cloud services are adopted in NOUN study centers; to determine the facilitators and students levels of awareness on the usefulness of online based cloud services in NOUN study centers; to determine the level of usability of online based cloud services in NOUN study centers; and to find out the challenges and constraints facing the adoption and usage of online based cloud service in NOUN study centers;

METHODS

The study adopted the cross-sectional survey design. The population for the study consisted of 10,827 respondents, which comprise of 10,590 students and 237 facilitators from the three study

centres (Abuja, Jos and Lafia) in the North Central Zone, which were selected out of the seven study centres in the North central zone. The sample size was 960 respondents which represents 20% of students and facilitators.

Five instruments were used for data collection: Students Questionnaire (SQ); Facilitators Questionnaire (FQ); Students Interview Schedule (SIS); Facilitators Interview Schedule (FIS) and Usability Checklist in NOUN Study Centers (UCNSC). There are two sections for each of the questionnaires for both students and facilitators. Section A was on personal data of the respondents while in section B, data were Four Point Likert Scale. The self-constructed 15 items questionnaires were validated by three experts in Tests and Measurement, Statistics and Educational Technology from University of Jos. Data obtained were analyzed using percentage and mean for the four research questions formulated to guide the study.

Table 1 shows that on the level of adoption of online cloud based services, 66.4% of the respondents responded that electronic mail was highly adopted, 17.5%, 11.% and 4.6% of the respondents responded moderately adopted, low adopted and not adopted respectively. The data further revealed that only 4.2% of the respondents responded that storage services was highly adopted 7.4%, and 6.7% indicated moderately adopted and low adoption respectively while not adoption of storage service has the highest value of 80.7%. On the adoption of collaboration tools 20.0%, 19.1% 32.1% and 28.8% respondents responded highly adopted, moderately adopted, low adopted and

not adopted respectively. Similarly, 21.6%, 20.7%, 17.6 %and 24.1% respondents responded highly adopted, moderately adopted, low adopted and not adopted respectively. Lastly, 4.9%, 6.1% and 3.5% indicated highly adopted, moderately adopted and low adopted respectively while not adoption of extra processing power has the highest value of 85.5%.

Table 2 indicates that students' opinion on high awareness of usefulness of online based cloud services at NOUN study centres is 40.9% while that of their facilitators is 55.3%. The percentage opinion of the facilitators is found to be greater than that of students with 15.0%. 50% of the students' responded that online based cloud services are moderately aware to them while only 25.5% of the facilitators responded on moderately awareness of online based cloud services in NOUN study centres. On low awareness of online based cloud services, 9.1% of students responded while 19.1% of the facilitators responded low awareness of online based cloud services. Facilitators response on low awareness of electronic media in NOUN study centres is greater than that of students with 10%.

Result in table 3 shows that 53.4% of the respondents indicated that the Mostly Use Online Cloud Services (MUOCS) in NOUN study centres is Email which is above the 50% bench mark. 22.1%, 16.4% and 8.1% of the total number of respondents responded on Use Online Cloud Services (UOCS), Sometimes Use Online Cloud Services (SUOCS) and Never Use Online Cloud Services (NUOCS) respectively.

Table 1: Level of Online Cloud Services Adoption in NOUN Study Centers

Online Cloud Services	Responses				Total %	Mean
	Highly Adopted %	Moderately Adopted %	Low Adopted %	Not Adopted %		
Electronic mail	66.4	17.5	11.5	4.6	100	2.26
Storage Services	4.2	7.4	6.7	80.7	100	0.73
Collaboration Tools	20.0	19.1	32.1	28.8	100	0.75
Virtual Office	21.6	20.7	17.6	24.1	100	0.76
Processing Power	4.9	6.1	3.5	85.5	100	1.40

Table 2: Facilitators and Students Level of Awareness on the Usefulness of Online Based Cloud Services in NOUN Study Centers

Awareness of Usefulness of Online Based Cloud	Students		Facilitators	
	f	%	f	%
High Awareness	867	40.9	26	55.3
Moderate Awareness	105	50.0	12	25.5
Low Awareness	192	9.1	9	19.1
Total	2118	100.0	47	100.0

Table 3: Extent of Internet Based Clouds Services Utilization in NOUN Study Centres

Online Based Clouds Services Utilization	Responses				Total %	Mean
	MUOCS %	UOCS %	STUOCS %	NUOCS %		
Electronic mail	53.4	22.1	16.4	8.1	100	2.21
Storage Services	3.1	17.9	14.6	64.4	100	0.90
Collaboration Tools	3.9	15.2	29.4	50.6	100	0.93
Virtual Office	33.9	47.4	14.5	4.2	100	0.89
Processing Power	5.9	12.4	19.3	62.4	100	1.42

On storage services, 3.1%, 17.9%, 14.6% and 64.4% respondents responded on MUOCS, UOCS, SUOCS and NUOCS respectively. 3.9%, 15.2%, 29.4% and 50.6% respondents responded on MUOCS, UOCS, SUOCS and NUOCS respectively for Collaboration Tools. Similarly, on Virtual Office, 33.9%, 47.4%, 14.5% and 4.2% respondents responded on MUOCS, UOCS, SUOCS and NUOCS respectively. Lastly, only, .5.9% of the respondents indicated that they mostly use online extra processing power; majority of the respondent 52.4% indicated that they never use online extra Processing Power

Table 4: Challenges Facing Adoption and Usage of Online Based Cloud Service in NOUN Study Centres

Challenges Facing Usage of Online Based Cloud Service	Yes		No	
	Count	%	Count	%
LIC	1211	55.9	954	44.1
NF	1012	46.7	1153	53.2
PKCS	1051	48.9	114	51.5
MCSH	1512	69.8	653	30.2
NACSN	1215	56.1	950	43.9

Result in table 4 shows that 55.9% of the respondents indicated that Lack of Internet Connectivity (LIC) as an impediment to Usage of Online Based Cloud Services in NOUN study centres which is above the 50% bench mark. 46.7% of the respondents indicate Network Fluctuation (NF) which is less than the 50% bench mark. 48.9% of the respondents are of the opinion that Poor Knowledge of Online Cloud Services (PKCS) by facilitators and students on the operation of Online Based Cloud Services post a challenge on it adoption and usage in NOUN study centres. 69.8% of the respondents which is greater than 50% bench mark by 19.8% responded that one of the major challenge facing accessibility of electronic media in the centres are that of Malfunctioning of Cloud Services Hardware (MCSH) facilities. On Non Availability of Cloud Services

Packages (NACSN), 56.1% of the respondents agree that it is a challenge facing the adoption and usage of online based cloud service in NOUN study centres in North Central zone

DISCUSSION

The result obtained from this study show that one of the most adopted online based cloud services in NOUN study centres in North Central Zone is Email. It was observed that the use of E-mail attract significant cost reduction, access from anywhere, support for teaching and learning, free or pay per use and is 24 hours access to infrastructure and content.

Majority of staff and students in NOUN study centre don't use the online based cloud storage services. Only few of them were found to be using storage infrastructures like Goggle Drive, Amazon Cloud drive and Drop Box. Though many staff and students of NOUN study centres said that they have not adopted the online cloud based collaboration tools, only few have ever come across any of the online cloud collaboration solutions such as Google Wave, Mikogo, Spicebird, Stixy and Vvew. Some respondents reported that they adopted and use Virtual Office online suite solutions like Microsoft's Office Live.

On online cloud based Extra Processing Power, the number of respondents who reported non adoption of extra processing power were found to be greater than those who are of the opinion of high adoption. The study revealed only 40.9% of the students are highly aware of the usefulness of online based cloud services at NOUN study centres while that of their facilitators was found to be 55.3%. The percentage opinion of the facilitators was found to be greater than that of students. The percentage of respondents who are aware of the usefulness of online based cloud services at NOUN study centres are more than that of those who are not aware.

The online extra Processing Power was found not to be popular with both staff and students of NOUN in all the study centres. It was also observed from the study that lack of internet connectivity,

network fluctuation, poor knowledge of online cloud services by facilitators and students on it modes of operations, malfunctioning of cloud services hardware facilities and non-availability of cloud services packages are impediment to usage of online based cloud services in NOUN study centres

SUMMARY OF FINDINGS

The most adopted online based cloud services in NOUN study centres in North Central Zone is Email because of its significantly low cost, access from anywhere, support for teaching and learning, free or pay per use and its 24 hours access to infrastructure and content. Majority of staff and students in NOUN study centres don't use the online based cloud storage services. Only few of them were found to be using storage infrastructures like Google Drive, Amazon Cloud drive and Drop Box. Staff and students of NOUN study centres have not adopted the online cloud based collaboration tools, only few have ever come across any of the online cloud collaboration solutions such as Google Wave, Mikogo, Spicebird, Stixy and Vyew.

Only few staff and students of NOUN adopted and use Virtual Office online suite solutions like Microsoft's Office Live. The number of staff and students who are yet to adopt extra processing power were found to be greater than those who are of the opinion that it is highly adopted. The percentage of respondents who are aware of the usefulness of online based cloud services at NOUN study centres are more than those who are not aware. The online extra Processing Power was found not to be popular with both staff and students of NOUN in all the study centres. It was also observed from the study that lack of internet connectivity, network fluctuation, poor knowledge of online cloud services by facilitators and students on it, modes of operations, malfunctioning of cloud services hardware facilities and non-availability of cloud services packages are impediments to usage of online based cloud services in NOUN study centres.

CONCLUSION AND RECOMMENDATION

Online based cloud services have been growing rapidly; it is vast and flexible; it involves solutions offering significant advantages to teaching and learning in institutions like National Open University of Nigeria. Universities should value the opportunities offered by online based cloud services, effectively adopt and use them to bring about new innovations in teaching and learning. It is a tool for instructors to

make learning possible just as in a traditional classroom, but only if the instructor is willing and able to use them.

It is our belief that this paper will help distance learning administrators to think proactively about online based cloud services, and thus engage in more productive measures that will bring about the best practices of cloud adoption and its potential implementation in distance learning

It is recommended that the curriculum of National Open University should be structured in such a way that cloud computing and its numerous benefits and opportunities will be taught as a course to all students in their first year of study. Management of National Open University of Nigeria should ensure adequate and constantly available internet network connection. Management of National Open University of Nigeria should employ the services of professionals in the field of cloud computing and cyber security with in-depth knowledge of SaaS, PaaS and IaaS to look at the possibility of officially adopting cloud computing as a major method of instruction after which they will be charged with the responsibility of designing, maintaining, protecting and advising the institution on issues concerning online based cloud services. The importance and usefulness of Online Based Cloud Storage, Online Collaboration Tools, Virtual Office Online Suite and Online Extra Processing Power Services should be stressed by authorities responsible for orienting staff and students on new developments in the university. Enough cloud services hardware facilities should be made available by management of National Open University Nigeria.

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