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Securing Technology for Virtual Learning Process using Cloud Computing Environment for Circular Economy and Sustainable Development

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ABSTRACT

This study determined the influence of securing technology for virtual learning process using cloud computing environment for circular economy and sustainable development. The design was a descriptive survey research design. Survey research design was considered most appropriate for this study because it allows the researcher to make inference about the population by selecting and studying the sample for the study. The population of the study comprised of 206 library professionals from the Nigerian Library Association, Cross River State Chapter. The sample size was the entire population; hence the census enumeration sampling technique was employed. The study utilized Securing Technology for Virtual Learning Process Questionnaire. The reliability estimate of the instrument was established through trial testing of the that shares the same characteristics. Cronbach Alpha reliability method was used to test the internal consistency of the instrument and the reliability index ranged from 0.79 to 0.83 respectively. The statistical analysis used was one-way Analysis of variance at 0.05 level of significance. The results revealed that there is a significant influence of zoom technology on virtual learning process using cloud computing environment and zoho technology significantly influence virtual learning process using cloud computing environment. The study recommends among others that as library professionals are well known for their information dissemination, members of the National Library Association (NLA), Cross River State Chapter should place more emphasis on training of its members on the use of virtual learning tools and engage its members on more of the virtual conferences and seminars meetings as the world is moving towards cloud computing environment coupled with series of restriction on physical human contacts. These will enable them have more knowledge about cloud computing environments for easy collaboration and access to the global world.

1. INTRODUCTION

Bonding with other people in the same space is a rich environment to connect with. Conferencing gives the advantages of network expansion. With video streaming, one can join in one of the sessions going on to complement its physical events and maintain the usual annual events using

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computers, mobile phones or IPad. Conferences are meant for professionals and researchers to meet each other and deliberate on solving diverse challenges through research discussions and quality interactions thereby facilitating networking, helping attendees to organise meetings and connections.

Conferences were forced to shut down as a result of the global lockdown that rippled various activities across the world making physical events to be cancelled out-rightly thereby erupting virtual conference interactions where attendees could view, talk and discussion online. Learning is becoming more and more complex as a result of coronavirus pandemic otherwise known as COVID-19. COVID-19 is one of the worlds' deadliest diseases that have desolated and reduced human existence. Coronaviruses are large family virus that are able to be transmitted from animals to humans and they cause severe illness such as serious respiratory disorder coupled with cold. For instance; kidney failure and death can occur as a result of corona virus infection (World Health Organization, 2021). The disease spreads among individual through droplets produced from the respiratory system of infected people, often during coughing or sneezing.

The implications of the coronavirus pandemic from an educational point of view, have pushed professionals and researchers to adopt online remote educational technology where continuous learning and sharing of ideas can still go ahead without hindrance. This situation has come with its own trial and error and uncertainty for everyone. According to the United Nations (2020), COVID-19 pandemic has touched every aspect of educational sector, both in primary to tertiary institutions of learning, constituting an inevitable disruption in academic calendar causing total closure of classrooms and research centres across the globe thereby distorted the ongoing face-to-face classroom discussions, seminar attendance and physical conference presentations.

The closure of educational institutions no doubt, may have a dramatic impact on organising conferences by library professionals (Tamrat & Teferra, 2020). The effect of such action includes interruption in intellectual learning processes, tendencies of postponing conference sessions, outright cancelation of hosting of conferences and symposiums amongst others. As a result, stakeholders in education and researchers are now seeking alternative teaching and learning tools to help avoid complete collapse of the education sector. The online virtual arena has worked well for ensuring that learning continues, research is shared and, in many instances, attracting a greater reach of delegates that may not have ordinarily attended in-person, thus increasing knowledge sharing among professionals (UNESCO, 2020).

However, most of these technologies were not designed with formal learning in mind. This is alien to educational institutions in Africa and Nigeria in particular. While these

technologies have brought about a paradigm shift in the traditional practices in processing, storing, gathering and brainstorming on knowledge sharing, it has allowed researchers to fill an urgent gap in the wake of the lockdown, causing an unusual discontinuity in the pattern of attending conferences and a threat to physical contact learning process. Delegates miss out their usual networking and the chance of deeper conversations with other attendees. More so, it has been challenging for sponsors and exhibitors in achieving the needed engagement that they would usually experience during face-to-face conversations.

With the emerging cloud computing environment, members of the National Library Association (NLA), Cross River State Chapter professionals are encouraged to explore virtual learning process using their internet enabled computers, laptops, interactive board, projectors, and audio systems. Hence, the efficacy of securing virtual technologies such as zoom and zoho for fostering continued learning cannot be over emphasized when exploiting cloud computing environment. Cloud computing is the practice of using a network of remote servers through zoom or zoho, hosted on the internet to store, manage and process data using internet enabled computers, mobile phone and IPad (Robab, Sim, Jafarkarimi, Hee & Saadadoost, 2014). The online learning tools such as zoom and zoho are cloud-based services which offers meetings, content sharing and video conferencing capabilities and watching recorded lessons. It helps bring together frictionless environment with easy, fast and reliable cloud platform for video and audio conferencing, collaboration, instant chats where questions are asked and instantly analysed and evaluated by educators across mobile devices, computers or IPads. It has become imperative for researchers and professionals in National Library Association (NLA), to continuously share information and collaborate ideas among themselves using the various virtual learning platforms in attending conferences.

It is becoming increasingly difficult to ignore cloud computing technology in conference attendance. However, rapid changes in information technology are having a serious effect on teaching framework designs. So far, however, there has been little discussion about cloud computing benefits in domains of teaching frameworks which propels us to study and redesign teaching frameworks considering cloud computing. The deployment of virtual technologies in delivering learning and teaching processes has led to an increase in virtual connectivity thereby triggering many changes in teaching approaches and techniques.

In order to bridge the gap and ensure uninterrupted educational interactions among professionals across the globe are setting up virtual means of integration to mitigate the impact of the pandemic. Many conference organisers are attempting to shift towards online virtual interaction and learning (Moses, Hayatudeen & Jummai, 2021). Virtual learning is seen as a substitute learning that its

entirety is dependents on the use of virtual tools with no physical recourse to bodily gathering among professionals in collaborative interactions (Tamrat & Teferra, 2020). In the same manner, many developing countries are making concerted efforts at adopting the same approach; however, this has become a difficult task due to deficient infrastructure, mixed perceptions, low technology skills, high cost of internet connectivity and inadequate preparedness by the professionals to embrace technological change.

The idea behind embracing online virtual learning during the pandemic is that it provides continued flexibility and consistency in learning pedagogy. In addition, distance becomes no barrier for learning and creating new learning environments for collaborative and interactive research using cutting edge technological tools devoid of spreading Covid-19 pandemic (Tamta & Ansari, 2017). Amidst all the benefits prevailed in adopting cloud computing technology by library professionals in cross river state for collaborative and interactive research, there are also many challenges confronting it its usage. They include: security and privacy threats, updating of software integration, internet connectivity/coverage, navigation from one cloud to other, computing performance, reliability and availability as a result of inadequacy of infrastructures among others. It would seem these lapses are likely to limit professionals in gaining access to virtual learning process using cloud computing environment thereby limiting online conferences and seminar attendance. The problem of this study put in a research question is, what is the influence of securing technology for virtual learning process using cloud computing environment among library professionals in cross river state, Nigeria?

Purpose of the study

The purpose of this study was securing technology for virtual learning process using cloud computing environment for circular economy and sustainable development. Specifically, the study sought to:

1. Determine the influence of zoom technology on virtual learning process using cloud computing environment;
2. Find out the influence of zoho technology on virtual learning process using cloud computing environment.

Research questions

1. What is the influence of zoom technology on virtual learning process using cloud computing environment?
2. How does zoho technology influence virtual learning process using cloud computing environment?

Research hypotheses

1. Zoom technology does not significantly influence virtual

learning process using cloud computing environment;

2. There is no significant influence between zoho technology for virtual learning process using cloud computing environment.

The use of virtual learning process using cloud computing tools can aid the teaching and learning processes. Meanwhile, virtual learning process using cloud computing tools for collaborative learning may play a vital role in constructing a positive learning experience for library professionals because its applications are more convenient for conference meetings, sharing of knowledge, sending, and receiving feedbacks and recording proceedings during meetings. Ananga and Biney (2018) study on effectiveness of face-to-face and online teaching and learning in higher education. Three research questions were raised for the study using purposive sampling approach for the study. Survey research design was adopted for the study with a sample of three hundred and twenty-two (322) library staff from four selected academic libraries. Structured questionnaire was used in collecting data. Data collected was analysed using frequency and simple percentage. The study found that using distance learning as a case study, the two methods is more preferred by the faculty and lecturers. The study suggests that academics or lecturers should endeavour to adopt blended or hybrid mode in their teaching and learning processes.

Joseph, Barnabas, Grace, Mathew, Henry, Tunde and Isola (2021) study investigated Nigerian University lecturers' perspective and response to virtual learning as an alternative to face-to-face teaching method during the pandemic. Two research questions and hypotheses were raised for the study using a sample of 192 lecturers. The study relied on primary source of data using a questionnaire for data collection. The population used for the study was 435 lecturers. The data collected was analysed using Pearson Correlation. The study found that lecturers from private universities responded to virtual teaching than those from public universities; that the presence of infrastructural orientation influences virtual orientation; and that a negative relationship exists between the sociodemographic/occupational variables (gender, current position, years of experience) and virtual orientation of lecturers at Nigerian universities.

Eze, Chinedu-Eze and Bello (2018) examined adoption and utilisation of e-learning facilities by lecturers in Nigerian private tertiary institution. Three research questions were raised for the study using simple random sampling approach with a sample of 120 researchers in the four sampled institutions. Survey research design was used for the study. The instrument used for collection of data was a semi-structured interviews questionnaire. Data collected was analysed using data driven thematic approach (a similar approach to grounded theory). The findings reveal that M-University's e-learning facilities are adequate and accessible to users, and most teachers are comfortable

with utilisation of various facilities during classes compared to most public tertiary institutions. Although, the utilisation has not been maximised. However, attitude of users, inadequate internet facility, inadequate training of users affects the successful adoption.

Njoku and Ken-Agbiriogu (2021) study investigated awareness and use of cloud computing; its implications by libraries in selected academic libraries in Imo State, Nigeria. Four research questions and three hypotheses were formulated. Survey research design was adopted. The total population of the study was 53 librarians. The sample size was the entire population; hence the census enumeration sampling technique was employed. Rating scale was used for data collection. Data collected were presented and analysed using mean, standard deviation, and F-ratio (ANOVA). Findings reveal that there is certain level of awareness on cloud computing technologies and models in the libraries studied. It was also discovered that cloud computing technology were used by libraries in the institutions studied, and economy of resource cost effectiveness and file sharing are some of the major positive implications of librarians' adoption cloud computing technologies. However, security and privacy, multiple taxation were also identified as major negative implications of cloud computing adoption by the librarians in discharging their functions in the libraries.

Nganga, Waruru and Nakweya (2020) noted that online learning preparedness varies from one institution to the other. Not all lecturers had been trained on how to participate in online learning. Most students do not have laptops or money to buy internet bundles, shortage of devices for online learning, closure of internet cafés and lack of computer skills.

Moses, Hayatudeen and Jummai (2021) study investigated the perception and readiness of students towards online learning in Nigeria during the Covid-19 pandemic. Five research questions were raised for the study using census sampling approach with a sample of 148 undergraduate students drawn from the population as the sample size. This study employed descriptive survey research design and structured questionnaire was the instrument used for the data collection. A total of one hundred and forty-eight (148) undergraduate students was used as the population. The collected data was analysed using tables, frequency counts, charts and percentage. The study revealed that majority of the respondents claimed to be conversant with online learning with a high level of readiness and high level of ICTs skills and competencies needed for online learning duo fear of high cost of data, poor internet services, erratic power supply, inaccessibility to online library resources and limited access to computer were the major perceived challenges to effective online learning.

2. RESEARCH METHODS

The study design was a descriptive survey research design. The descriptive survey research design is considered most appropriate for this study because it allows

the researcher to make inference about the population by selecting and studying the sample for the study. The population of this study comprised 206 library professionals from the National Library Association, Cross River State Chapter. The sample size was the entire population; hence the census enumeration sampling technique was employed. The study utilized a researcher's developed instrument entitled "Securing Technology for Virtual Learning Process Questionnaire (STVLPQ)" The STVLPQ was validated by experts in Measurement and Evaluation. The reliability estimate of the instrument was established through trial testing of the instrument which was administered to 28 respondents who were not part of the final study but share the same characteristics. Cronbach Alpha reliability method was used to test the internal consistency of the instrument and the reliability index ranged from 0.79 to 0.83 respectively. The statistical analysis used was One-way Analysis of Variance (ANOVA).

3. RESULTS AND DISCUSSION

The results emanating from this study were presented hypothesis by hypothesis as presented below:

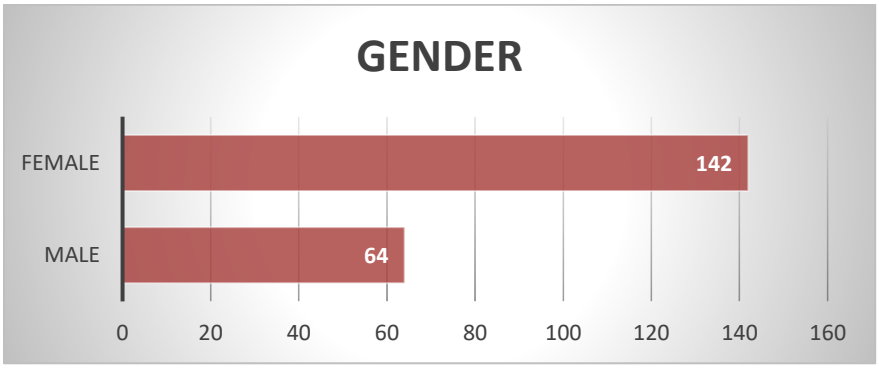

FIG. 1: GENDER

Figure 1 represents the gender distribution of the target respondents across all the levels of the

library professionals from the National Library Association, Cross River State Chapter. With a total of 206 respondents, 142 representing the female population while the remaining 64 represents males. This goes to show the high level of gender equality practiced across the target library professional, this also depicts how diverse and gender sensitive the opinions that informs the findings of this study are.

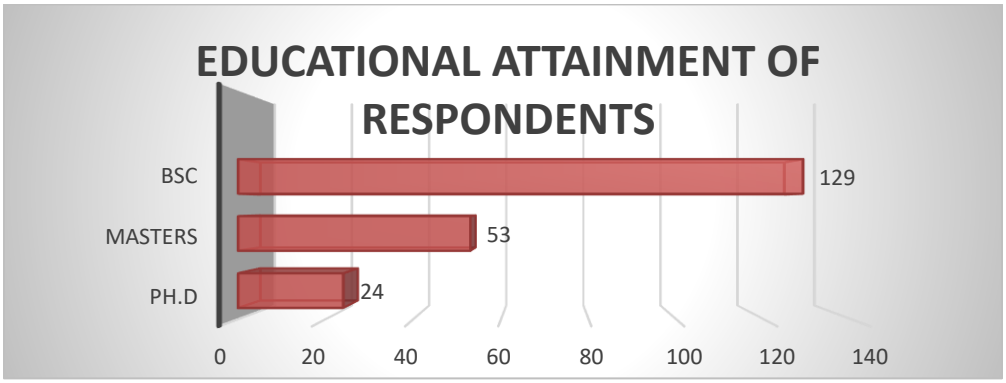

Fig. 2: Educational attainment of respondents

The educational attainment of respondents reflects a great deal in their capacity to securing technologies for learning and research using cloud computing environment. Figure 2 represents the educational attainment of respondents across all the levels of the library professionals from the National Library Association, Cross River State Chapter. With a total of 206 respondents, one hundred and seventy-seven (129) are BSc holders representing the highest respondents, eleven (53) represents Master's Degree Holders while the remaining twenty-four (24) respondents represents those with PhD respectively.

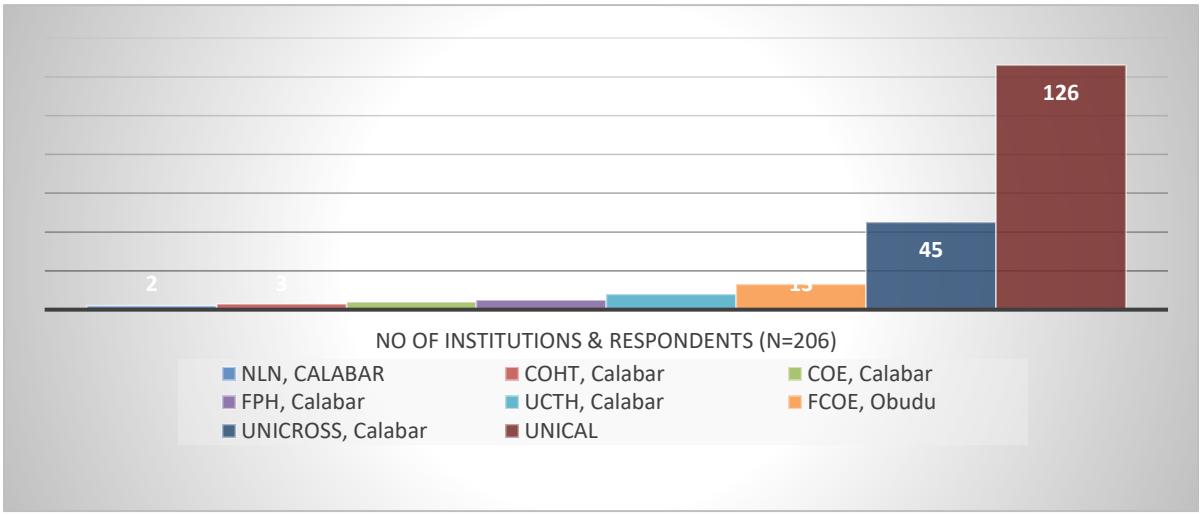

Fig. 3: No of institutions & their respondents (N=206)

Figure 3 represents the no of institutions of the target respondents across all the levels of library professionals from the National Library Association, Cross River State Chapter. With a total of 206 respondents. 126 representing University of Calabar Library; 45 representing University of Cross River State (UNICROSS) Library, Calabar; Federal College of Education (FCOE) Library, Obudu representing 13; University of Calabar Teaching Hospital (UCTH) Library, Calabar representing 8; Federal Neuropsychiatric Hospital (FNH) Library, Calabar representing 5; College of Education (COE) Library, Akamkpa representing 4; College of Health Technology, (CHT)

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Library representing 3 while National Library of Nigeria (NLN), Calabar represents 2 respondents.

Research hypothesis one: Zoom technology does not significantly influence virtual learning process using cloud computing environment. To answer this hypothesis, One-Way Analysis of Variance (ANOVA) was employed to test the hypothesis as presented in Table 1.

It can also be discerned from Table 1 with the descriptive statistics that the total of 107 professionals used computer technology in projecting zoom conference with a mean and standard deviation of 15.05 and 2.52, mobile phone users constituted 91 respondents with mean of 16.14 and standard deviation of 2.22, while IPad users constituted 8 professionals with mean and standard deviation of 16.38 and 1.19 respectively.

The second parts of Table 1 clearly show the Summary of One-way Analysis of Variance of Between and within group sum of squares are 64.313 and 1129.784; at 3 and 203 degrees of freedom, the mean squares between and within are 32.156 and 5.565, with an F calculated value of 5.778 that was found to be greater than the critical F-value of 2.62. Therefore, the null hypothesis of zoom technology does not significantly influence virtual learning process using cloud computing environment was rejected (F=5.778; p-value=.004), which was found to be less than the chosen alpha of .05. Thus, the null hypothesis is rejected. This implies that zoom technology significantly influence virtual learning process using cloud computing environment. Zoom technology is a great tool for collaboration. It's a great way to encourage pair work or group work and allow professionals to work independently and has become an indispensable technology for the way we work, teach and learn together in remote areas.

Table 1: Descriptive statistics with influence of zoom technology on virtual learning process using cloud computing environment

Categories of zoom technology	N	$\overline{X}$	SD
Computer	107	15.05	2.52
Mobile phone	91	16.14	2.22
IPad	8	16.38	1.19
Total	206	15.58	2.41

Sources of variance	Sum of squares	Df	Mean square	F	P-value
Between Group	64.313	3	32.156		
				5.778*	.004

With Groups	1129.784	203	5.565	
Total	1194.097	206		

P<.05; df = 3, 203; critical F = 2.62

Research hypothesis two: There is no significant influence between zoho technology for virtual learning process using cloud computing environment. To answer this hypothesis, One-Way Analysis of Variance (ANOVA) was employed to test the hypothesis as presented in Table 2.

It can also be discerned from Table 2 with the descriptive statistics that the total of 92 professionals used Microsoft word in projecting zoom conference with a mean and standard deviation of 14.83 and 2.51, power point users constituted 69 respondents with mean of 14.12 and standard deviation of 2.53, projector users constituted 7 professionals with mean and standard deviation of 13.00 and 2.52, while wireless microphone users constituted 38 professionals with mean and standard deviation of 13.05 and 2.07 respectively.

Table 2: Descriptive statistics with influence of zoho technology on virtual learning process using cloud computing environment

Categories of zoho technology	N	$\overline{X}$	SD
Microsoft Word	92	14.83	2.51
Power point	69	14.12	2.53
Projector	8	13.00	2.52
Wireless microphone	38	13.05	2.07
Total	206	14.19	2.52

Sources of variance	Sum of squares	df	Mean square	F	P-value
Between Group	96.655	4	32.218		
				5.414*	.001
With Groups	1202.185	202	5.951		
Total	1298.840	206			

P<.05; df = 4, 203; critical F = 2.62

The second part of Table 2 clearly show the Summary of One-way Analysis of Variance of Between and within group sum of squares are 96.655 and 1202.185; at 4 and 202 degrees of freedom, the mean squares between and within are 32.218 and 5.951, with an F calculated value of 5.414 that was found to be greater than the critical F-value of 2.62. Therefore, the null hypothesis of zoho technology does not significantly influence virtual learning process using cloud computing environment was rejected (F=5.414; p-value=.001), which was found to be less than the chosen alpha of .05. Thus, the null hypothesis is rejected. This implies that there is a significant influence of zoho technology on virtual learning process using cloud computing environment. Zoho's screen sharing can give professionals a great opportunity to develop their intellectual skills by sharing and engaging materials such as videos, articles and presentations. After trainings, educators could also reflect on their lessons by recording a video and sharing with their colleagues.

Discussion of findings

The result of the first hypothesis indicated that there is a significant influence of zoom technology on virtual learning process using cloud computing environment. It is clear that library professionals in cross river state are aware of zoom technology and utilize it for their teaching and learning process. This is evident as they all agree on the extent of use of cloud computing technologies. This implies that they use it at their individual quarters/offices to access information, enrich their social knowledge and skills as well as solving other academic challenges. This finding is in agreement with the views of Moses, Hayatudeen and Jummai (2021) study which revealed that majority of the respondents claimed to be conversant with online learning with a high level of readiness and high level of ICTs skills and competencies needed for online learning duo fear of high cost of data, poor internet services, erratic power supply, inaccessibility to online library resources and limited access to computer were the major perceived challenges to effective online learning. Also, Njoku and Ken-Agbiriogu (2021) study on the awareness and use of cloud computing; its implications by libraries in selected academic libraries in Imo State, Nigeria. Findings revealed that there is certain level of awareness on the use of cloud computing technology and that libraries utilize it in file sharing and discharging of other functions in the library.

The result of the second hypothesis indicated that there is a significant influence of zoho technology on virtual learning process using cloud computing environment. This has showed a positive implications of cloud computing adoption by library professionals from the Nigerian Library Association, Cross River State Chapter in respect to their professional service operation. The finding shows that efficiency of service, reduction of cost, unlimited

storage capacity, ease of access to information, file sharing etc are the positive implications of librarians' adoption of these technologies. This finding supports previous studies such as that of Ananga and Biney (2018) indicating that using distance learning as a case study, the two methods is more preferred by the faculty and lecturers. This assumption similarly adds to the work of other scholars such as Joseph, et al (2021) which found that lecturers from private universities responded to virtual teaching than those from public universities.

4. CONCLUSION

Virtual learning process using cloud computing environment has come to be great tool for educational collaboration. Its adequate integration will tremendously transform the entire library professionals and ensure optimization of resource satisfaction therein. The role of every library professional is to render quality service with ease of use to its members and to build confidence through capacity building in their users; this can only be achieved if they can reposition themselves to maximize the potentials of the cloud computing technologies.

Recommendations

The study recommended based on the findings:

1. that as library professionals are well known for their information dissemination, members of the National Library Association (NLA), Cross River State Chapter should place more emphasis on training of its members on the use of virtual learning tools and engage its members on more of the virtual conferences and seminars meetings as the world is moving towards cloud computing environment coupled with series of restriction on physical human contacts. These will enable them have more knowledge about cloud computing environments for easy collaboration and access to the global information.
2. The library professionals are duty bound to sensitize their subordinates to abreast with the new trends in information world. This can be done by way of encouraging them to embark on staff development on virtual learning process using cloud computing environment to enable them to be update their skills and knowledge and abreast with global best practices.

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