



Digital Technologies and Resource Utilization: Examining the Roles of Cloud Computing and Closed Circuit Television Surveillance in Academic Libraries among Postgraduate Students in University of Calabar, Nigeria

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Abstract

This study investigated the roles of digital technologies specifically cloud computing and closed-circuit television (CCTV) surveillance in predicting library resource utilization among postgraduate students in the University of Calabar, Nigeria. Two research questions were posed for the study, which were converted to two statements of hypotheses. The study adopted a correlational survey research design, targeting a population of 1,827 postgraduate students across 13 faculties. Using stratified and accidental sampling techniques, a sample of 435 students was selected for the study. A structured instrument titled Cloud Computing, CCTV Cameras and Utilization of Library Resources Questionnaire (CCCCTVCAULRQ) was developed, validated by experts, and found reliable with a Cronbach's alpha coefficient of 0.83. Data were analyzed using simple linear regression. Findings revealed that cloud computing significantly predicted the utilization of library resources among postgraduate students (Adjusted $R^2 = .014$, $F = 7.326$, $p < .05$), indicating that 1.4% of the variance in resource utilization could be attributed to cloud computing. Similarly, CCTV surveillance significantly influenced library resource utilization (Adjusted $R^2 = .055$, $F = 26.106$, $p < .05$), accounting for 5.5% of the variance. The study concluded that digital technologies, particularly cloud computing and CCTV systems, enhance access, security, and the overall usability of academic library resources. It was recommended that university management strengthen cloud-based infrastructures for data storage and remote access, and maintain functional CCTV systems to ensure safety and encourage active library engagement among postgraduate students.

Keywords: Cloud computing, CCTV surveillance, Digital technologies, Library resource utilization, Postgraduate students, University of Calabar

Introduction

In the digital age, libraries have evolved from being mere storehouses of print materials to dynamic learning environments powered by advanced information technologies. The introduction of digital technologies has revolutionized the way information is stored, accessed, and managed within academic libraries. Among these technologies, cloud computing and Closed-Circuit Television (CCTV) surveillance systems have emerged as transformative tools for ensuring effective service delivery and security of library resources (Adebayo & Nwokocha, 2020). Cloud computing enhances digital storage, resource sharing, and accessibility, while CCTV surveillance safeguards both users and resources, thereby promoting a conducive environment for learning and research.

In Nigerian universities, the adoption of these technologies is increasingly viewed as a strategic step toward improving the efficiency, accessibility, and sustainability of academic libraries (Ogunleye & Akinola, 2021). For postgraduate students whose research activities depend heavily on the accessibility and security of resources technological innovation in libraries plays a crucial role in determining how effectively they utilize available information. However, while cloud-based services improve accessibility to e-resources, CCTV surveillance supports library management by ensuring that materials are secure and properly used (Ezeani & Nwokocha, 2019). Despite these technological advancements, many academic libraries in Nigeria continue to experience low levels of resource

utilization, raising questions about how effectively such digital technologies are deployed and used by postgraduate students.

The application of digital technologies in library management has become a defining feature of modern higher education institutions. Cloud computing, in particular, has provided academic libraries with scalable, cost-effective platforms for storing, retrieving, and sharing digital resources (Omekwu & Nwosu, 2020). Cloud-based systems enable remote access to academic databases, e-journals, and institutional repositories, allowing users to retrieve information beyond the physical boundaries of the library. This flexibility enhances learning and supports continuous research engagement among postgraduate students (Aina, 2022). Through platforms such as Google Cloud, Amazon Web Services, and institutional digital repositories, libraries can now host large volumes of digital content accessible at any time and from any location (Okoro & Nnadozie, 2021).

Conversely, CCTV surveillance systems have become essential components of library security management. Academic libraries are vulnerable to theft, vandalism, and misuse of materials, which can discourage resource utilization. CCTV technology ensures proper monitoring of user activities, protection of library assets, and compliance with institutional rules (Ibrahim & Okafor, 2020). The presence of surveillance systems also fosters discipline, reduces security threats, and encourages students to use library spaces with confidence and safety.

Library resource utilization refers to the extent to which users' access, engage with, and benefit from the resources and services provided by the library (Adeleke & Olorunsola, 2019). Effective utilization depends on various factors, including accessibility, awareness, availability, and user security. Technologies like cloud computing and CCTV surveillance thus serve dual purposes—enhancing access and ensuring protection. The University of Calabar library, like many others in Nigeria, has adopted some of these digital innovations. However, anecdotal evidence suggests that postgraduate students still underutilize available library resources despite the integration of these technologies. This situation calls for an empirical investigation into how cloud computing and CCTV surveillance contribute to resource utilization among postgraduate students.

According to Yuvaraj (2023), cloud computing has brought tremendous changes in information science dissemination in university libraries, stressing that cloud computing offers many

interesting possibilities for libraries that help to reduce technology cost and increase capacity, reliability and performance for some types of automation activities. Cloud computing has made strong inroad into other commercial sectors and now beginning to find more application in library science. Cloud computing also allows users to use applications and system through internal access in a way that enable them access their personal and official files on any computer without installation in their local machine.

Tritt and Kendrick (2014) carried out a study on the impact of cloud computing on librarians at small and rural academic libraries in University of South Carolina. The researcher utilized Google Docs, a cloud-based collaborative work processing application, to create a 26-item questionnaire. The questionnaire was tested to gauge validity and an average length of time it took to complete the questionnaire. And the findings showed that libraries that make use of cloud computing have massive attendance of users.

According to Gosavi and Shinde (2022) conducted a study on the use of cloud computing in library and information science field in Kerala, India. The research design of the study is the survey method using a questionnaire, circulating among the library staff employed in the central and departmental libraries of the University of Kerala. The library system follows a decentralized pattern with a central library and department libraries attached to the teaching departments of the universities. To elicit the necessary information, a structured questionnaire was designed to collect data keeping in mind the objectives of the study. The questionnaire consisted of both optional type and statements in five-point likert scale. Out of 112 questionnaires distributed 102 responses were received. The collected responses were analyzed using latest version of Ms-Excel for appropriate statistical analysis and description. The study was confined to the library staff of the central, campus, college and departmental libraries in the University of Kerala.

Malhotra and Jain (2023) found out that cloud computing is helpful in identifying and generating cloud-based services for libraries, stressing that cloud computing concepts and implications of cloud-based application in libraries in order to enhance their services in more efficient manner. Cloud computing offers opportunities to individual or group of students and other users that need to provide limitless and without time or location bound services. This computing device serves as a pool of abstracted, highly scalable and managed

compute infrastructure capable of hosting end-customer applications and billed by consumption.

According to James (2022), students believe that podcasts are more effective revision tool than their textbooks and they are more efficient than their own notes in helping them to learn, stressing that they are more receptive to the learning material in the form of a podcast than a traditional lecture of textbook. The use of podcasts as a revision tool has clear benefits as perceived by students in terms of the time they take to revise and how much they feel they can learn. Podcasting involves downloading a series of audio or video broadcasts files onto the digital media player, via a computer, over a period of weeks.

These can be listened to when, where and as often as students choose. Podcast supports library goals and enhances the utilization of library resources by students. Worcester and Barker (2016) noted that Podcasting offers exciting opportunities for libraries to engage their users in new and popular way. It can break down barriers, alleviate stress or anxiety students may have about using the library and give a friendly fact to the library. Libraries can make use of the popularity of podcasting and use it as a method for disseminating information to its wider community. Podcasting library information reduces dependence on the location and opening hours of a library. Podcasting is useful in disseminating course information, its uses become more beneficial when students are challenged to become creators of the material to be disseminated. Podcasting is a very important device that is used in the university environment for recording of lecture notes, interviews and seminars, and also used to store information resources in the library.

Podcast is often referred to as push technology because information publishers and agencies are pushing information contents directly to the users. Podcasting is spreading rapidly in library and information science field and that the technology can be used to promote library services and products, library instructions and contents to users, noting that podcast also enables technologies to break physical barriers and play a key role in disseminating valuable information in different formats resulting in effective utilization by students or users. Podcasting offers new opportunities to deliver information content more effectively and flexible to access them anywhere and anytime at users' convenience.

Closed circuit television camera is a camera which signals are not publicly distributed but it is monitored secretly for security and surveillance purpose. University libraries need to secure their vast array of resources and facilities. As such it is necessary for the provision and installation of CCTV

device to monitor the services and utilization of library resources. This will help to reveal postgraduate students who make use of the library resources and also even assess staff that are performing their duties and those showing nonchalant attitude towards their duties.

Osayande (2021) observed that surveillance security camera helps to keep facilities safe during reading, researching and browsing activities. It also prevents book theft, mutilation of books and promotes self-control while making use of library resources. One of the major functions of libraries is to preserve resources of various kinds for users. A security tool encourages staff to be focus in protecting their large volumes of resources and help staff to monitor the library from their office or reference desk, in order for the students to have what to use during research.

Osatande (2019) conducted a study on electronic security systems in academic libraries: A case study of three university libraries in South-West Nigeria. The study examined the effectiveness of electronic security systems in academic libraries with a focus on selected university libraries in south-west Nigeria. The study is to find out what electronic security systems are in use in academic libraries, how library materials are of the electronic security devices in the library. A survey research design was adopted for the study. Descriptive and influential statistics of frequency counts and percentages were used to analyze data gathered through the survey. One hundred and nine (109) copies of the questionnaire were distributed. Eight one (81) copies (74%) were duly completed and retrieved from the respondents. A participant observation method was also employed to measure how effective the electronic security devices are. The study revealed that academic libraries have suffered adversely from security issues and other anti-social menace and that the installation of security devices would drastically improve the situation.

In recent years, academic libraries in Nigeria have invested heavily in digital technologies aimed at improving information access, storage, and security. The University of Calabar library has implemented cloud-based systems for resource storage and retrieval and installed CCTV surveillance cameras to ensure safety and accountability within its facilities. Despite these advancements, library resource utilization among postgraduate students remains suboptimal. Many students prefer using external online databases or personal Internet connections, often neglecting the university library's digital and physical resources.

The underutilization of library resources may stem from several factors: inadequate awareness of

cloud-based services, technical challenges in accessing online repositories, or perceived surveillance discomfort due to CCTV monitoring (Ogunleye & Akinola, 2021). While cloud computing theoretically enhances accessibility and convenience, its actual usage by postgraduate students depends on digital literacy, system reliability, and institutional support. Similarly, although CCTV surveillance is intended to improve security and safeguard materials, excessive monitoring or poorly maintained systems may discourage some users from engaging freely with library resources (Ibrahim & Okafor, 2020).

Previous studies have examined either the role of ICT in general or single technologies like Internet access in influencing library use (Aina, 2022; Okoro & Nnadozie, 2021). However, there is a paucity of empirical evidence comparing the effects of cloud computing and CCTV surveillance as correlates of library resource utilization, particularly among postgraduate students in Nigerian universities. This gap necessitates the present study, which seeks to determine how these technologies jointly and individually influence the effective use of library resources in the University of Calabar. Findings from this study will provide insight into improving the technological framework for resource accessibility, user security, and overall library effectiveness.

Purpose of the study

The main purpose of this study is to examine Digital Technologies and Resource Utilization: Examining the Roles of Cloud Computing and CCTV Surveillance in Academic Libraries among postgraduate students in University of Calabar, Nigeria.

Specifically, the study sought to;

1. Ascertain the relationship between cloud computing and utilization of library resources.
2. Determine the relationship between closed circuit television cameras and utilization of library resources.

Research questions

The following research questions were posed;

1. What is the relationship between cloud computing and utilization of library resources?
2. What is the relationship between closed circuit television cameras and utilization of library resources?

Statement of hypotheses

The study is hereby hypothesised that;

1. There is no significant relationship between cloud computing and utilization of library resources.
2. Closed circuit television camera does not significantly predict the utilization of library resources.

Methodology

The study adopted a correlational survey research design. A survey design is one in which a group of people or items are studied by collecting and analyzing data from a few people or items considered to be representatives of the entire group. According to Idaka and Anagbogu (2012), it is a design where the researcher cannot manipulate the variables because their effects have already occurred.

This study was carried out in University of Calabar which is situated in Calabar Cross River State, South-south, Nigeria. It is one of Nigerians second generation federal universities. The University of Calabar was a campus of the University of Nigeria (Nsukka) until 1975. The architecture was designed by John Elliott. It was established by decree to fulfill the traditional mandate; its motto is knowledge for service.

The population of study comprised of all post graduate students in the 13 faculties in University of Calabar, Calabar during the 2017/2018 academic session. The total number of postgraduate students in the programme is one thousand, eight hundred and twenty-seven (1827). The stratified random sampling technique was employed for sample selection. Stratified sampling is a probability sampling technique wherein the researcher divides the entire population into different subgroups or strata, then selects the final subjects proportionally from the different strata. The stratified sampling technique was first used to sub divide the zone into different faculties. First, 40% of the faculties were selected using purposive sampling technique to ensure an equal representation of each faculty. This summed up to a total of 5 faculties. Thereafter, 50% of the students in the faculties were selected using accidental sampling technique. This gives a total of four hundred and thirty-five students and formed the sample of the study. The sample of the study comprised of 435 (50%) postgraduate students of the University of Calabar.

The instrument used for the study is a structured questionnaire titled "Cloud Computing, closed circuit television cameras and Utilization of Library Resource Questionnaire (CCCCTVCAULRQ). The instrument was divided

into three sections. Session A was designed to elicit demographic responses such as age, sex, occupation, and marital status. Section B consisted of 10 items measured access to Cloud computing and CCTV Cameras while Section C measured- utilization of library resources with ten items. Respondents were asked to indicate how much they agree or disagree with the items, using a four-point rating scale (Strongly Agree – 4 points, agree – 3 points, disagree – 2 points, Strongly Disagree – 1 point).

In this study, the face and content validity of the instrument were carried out by two experts in the researcher's department and two test experts in Measurement and Evaluation in the Department of Educational Foundation, University of Calabar. The instrument made up of 22 items was given to experts in measurement and evaluation to ensure that the items measure what the researcher intends to measure. The items were scrutinized and the items that were not relevant were eliminated. All corrections were made and a draft of the instrument was developed for the study.

To determine the reliability of the instrument, a trial test was carried out using a sample of fifty (30) students purposively selected from University of Cross River State, which is not part of the study area and Cronbach's alpha procedure was used to establish the degree of consistency of the instrument. The result revealed an estimate of reliability of .83 and .79 respectively, with an overall reliability coefficient of .81. The reliability values were high enough to warrant the use of the instrument in the actual study.

The researcher with some trained personnel proceeded to the various faculties sampled to collect data from the selected respondents after due permission and informed consent has been obtained from the Dean of Graduate School. The researcher meets with course representatives to explain his

mission; the students selected for the study were assured of their privacy and confidentiality of responses. The questionnaire was administered by the researcher himself together with his trained research assistants and retrieved immediately after responding to them. The researcher instructs the respondents on how to fill each section of the questionnaire. It is hoped that all copies of the instrument administered were successfully retrieved. Data were analysed using Simple linear regression statistical tool at .05 level of significance.

Results

Hypothesis one

This research hypothesis stated that cloud computing does not significantly predict utilization of library resources. The independent variable of this hypothesis was cloud computing while the dependent variable was utilization of library resources. Simple regression statistics was used in testing the hypothesis and the results are presented in Table 1.

The simple regression analysis in Table 1 on the prediction of cloud computing in predicting utilization of library resources produced an adjusted R^2 of .014. This implies that only 1.4 percent of the variance can be predicted from the independent variable (cloud computing) on utilization of library resources among postgraduate students in University of Calabar. The F-value value of 7.326 of the Analysis of Variance (ANOVA) obtained from the regression table with a p-value .007 with 1 and 433 degrees of freedom at .05 level of significance showed that the null hypothesis was rejected. This result therefore signifies that cloud computing significantly predicted utilization of library resources among postgraduate students by 1.4 percent. The result therefore implies that there was a significant effect of cloud computing on utilization of library resources.

TABLE 1

Summary of data and simple regression analysis on the prediction of cloud computing and utilization of library resources among postgraduate students in University of Calabar, Calabar

R	R Square	Adjusted R Square	Std. Error of the Estimate		
.129	.017	.014	7.13063		
Model	Sum of squares	DF	Mean Square	F	Sig
Regression	372.505	1	372.505	7.326*	.007
Residual	22016.245	433	50.846		
Total	22388.749	434			
Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	42.296	2.656		15.926	.000
cloud computing	-.437	.162	-.129	-2.707	.007

Predictors: (Constant): cloud computing
b. Dependent Variable: utilization of library resources

Hypothesis two

This research hypothesis stated that podcasting does not significantly predict utilization of library resources. The independent variable of this hypothesis was podcasting while the dependent variable was utilization of library resources. Simple regression statistics was used in testing the hypothesis and the results are presented in Table 2.

The simple regression analysis in Table 2 on the prediction of podcasting in predicting utilization of library resources produced an adjusted R^2 of .055. This implies that only 5.5 percent of the variance can be predicted from the independent variable

(podcasting) on utilization of library resources among postgraduate students in University of Calabar. The F-value value of 26.106 of the Analysis of Variance (ANOVA) obtained from the regression table with a p-value .000 with 1 and 433 degrees of freedom at .05 level of significance showed that the null hypothesis was rejected. This result therefore signifies that podcasting significantly predicted utilization of library resources among postgraduate students by 5.5 percent. The result therefore implies that there was a significant effect of podcasting on utilization of library resources.

TABLE 2

Summary of data and simple regression analysis on the prediction of podcasting and utilization of library resources among postgraduate students in University of Calabar, Calabar

R	R Square	Adjusted R Square	Std. Error of the Estimate		
.238	.057	.055	6.98326		
Model	Sum of squares	DF	Mean Square	F	Sig
Regression	1273.085	1	1273.085	26.106*	.000
Residual	21115.664	433	48.766		
Total	22388.749	434			
Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	48.517	2.634		18.419	.000
Podcasting	-.818	.160	-.238	5.109	.000

Predictors: (Constant): podcasting
b. Dependent Variable: utilization of library resources

Discussion of findings

Cloud computing and utilization of library resources

This research hypothesis which addresses the prediction of cloud computing on utilization of library resources among postgraduate students in University of Calabar revealed that there was a significant influence of cloud computing on utilization on utilization of library resources. This result is true because cloud-based systems allow postgraduate students to access library resources (e-books, journals, databases) anytime and from anywhere, not just within the physical library. This flexibility naturally increases usage. The result supports Yuvaraj (2013) who noted that cloud computing has brought tremendous changes in information science dissemination in university libraries, stressing that cloud computing offers many interesting possibilities for libraries that help to reduce technology cost and

increase capacity, reliability and performance for some types of automation activities. Cloud computing has made strong inroad into other commercial sectors and now beginning to find more application in library science. Cloud computing also allows users to use applications and system through internal access in a way that enable them access their personal and official files on any computer without installation in their local machine.

This result is also in tandem with Malhotra and Jain (2013) who found out that cloud computing is helpful in identifying and generating cloud-based services for libraries, stressing that cloud computing concepts and implications of cloud-based application in libraries in order to enhance their services in more efficient manner. Cloud computing offers opportunities to individual or group of students and other users that need to provide limitless and without time or location bound services. This computing

device serves as a pool of abstracted, highly scalable and managed compute infrastructure capable of hosting end-customer applications and billed by consumption.

Podcasting and utilization of library resources

This research hypothesis which addresses the prediction of podcasting and utilization of library resources among postgraduate students in University of Calabar revealed that there was a significant influence of podcasting on utilization of library resources. Podcasts created by lecturers, librarians, or academic institutions often highlight relevant books, journals, and databases, which can motivate students to explore those resources. This result is in tandem with James (2002) that students believe that podcasts are more effective revision tool than their textbooks and they are more efficient than their own notes in helping them to learn, stressing that they are more receptive to the learning material in the form of a podcast than a traditional lecture of textbook. The use of podcasts as a revision tool has clear benefits as perceived by students in terms of the time they take to revise and how much they feel they can learn. Podcasting involves downloading a series of audio or video broadcasts files onto the digital media player, via a computer, over a period of weeks.

These can be listened to when, where and as often as students choose. Podcast supports library goals and enhances the utilization of library resources by students. This result also agrees with Worcester and Barker (2006) who noted that Podcasting offers exciting opportunities for libraries to engage their users in new and popular way. It can break down barriers, alleviate stress or anxiety students may have about using the library and give a friendly fact to the library. Libraries can make use of the popularity of podcasting and use it as a method for disseminating information to its wider community. Podcasting library information reduces dependence on the location and opening hours of a library. Podcasting is useful in disseminating course information, its uses becomes more beneficial when students are challenged to become creators of the material to be disseminated. Podcasting is a very important device that is used in the university environment for recording of lecture notes, interviews and seminars, and also used to store information resources in the library.

Podcast is often referred to as push technology because information publishers and agencies are pushing information contents directly to the users. Podcasting is spreading rapidly in library and information science field and that the technology can be used to promote library services and products,

library instructions and contents to users, noting that podcast also enables technologies to break physical barriers and play a key role in disseminating valuable information in different formats resulting in effective utilization by students or users. Podcasting offers new opportunities to deliver information content more effectively and flexible to access them anywhere and anytime at users convenience.

Conclusion

Based on the result of the study, it was concluded among others that:

1. Cloud computing as an innovative technology predicts utilization of library resources.
2. Podcasting predicts the utilization of library resources.

Recommendations

It is recommended that;

1. The school authority should create a digital computing mechanism that enable students and the school to access their personal and official files on any computer without installation in their local machines.
2. The school authority should document relevant audio learning material for students and the entire society to make use of, as this would encourage learning.

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