Assessment of the Administration and Services of Public Access Computers in Academic Libraries in Kaduna State, Nigeria

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Abstract—This study is posed to explore the practice of Public Access Computers (PACs) in academic libraries in Kaduna State, Nigeria. The study aimed to determine the computers and other tools available, their services and challenges of the practices. Three questions were framed to identify number of public computers and tools available, their services and problems faced during the practice. The study used qualitative research design along with semi-constructed interview and observation as tools for data collection. Descriptive analysis was employed to analyze the data. The sample size of the study comprises 52 librarian and IT staff from the seven academic institutions in Kaduna State. The findings revealed that, PACs were provided for access to the Internet, digital resources, library catalogue and training services. The study further explored that, despite the limit number of the computers, users were not allowed to enjoy many services. The study recommends that libraries in Kaduna state should provide more public computers to be able to cover the population of their users; libraries should allow users to use the computers without limitations and restrictions.

Keywords—Academic libraries, computers in the library, digital libraries, public computers.

I. INTRODUCTION

THE popularity and necessity of computers made many organizations, especially libraries and community centers, to provide many computers for public usages. These computers are usually kept in a single or different location. Since the computers are provided for public use, the setup referred as PACs. Therefore, PACs is a group of computers and other devices provided for public usage which offers information related services [1]. Technically, the Bill and Melinda Gates Foundation [2] defined PACs and their services as follows:

1. Computers must be made freely available with full privilege of access by users.
2. These computers must provide access to Internet and other scholarly databases.
3. The computers must provide access to educational, references and other production software.

Because PACs comprise a computer system, a local network along with internet connectivity to offer various services for especially those that do not have access to computer or internet at home. This definition categorized the components of PACs as follows:

- Hardware: This category includes computers and other range of devises such as printers, scanners, routers and switches for information and communication services.
- Software: This can includes operating system; such as Windows, Linux, etc. application; such as word editors, spreadsheet analysis, graphics designers, e-readers, assistive software; library automation software, functional and security software; such as web browsers, antivirus, anti-spyware, networking software; such as integrity maintenance software, time management, print management, other networking protocols.

Security, control and cost management are the major benefits of networking public computers within a PACs venue. Since public computers are being used by different personalities, it must be secured to prevent misuses. Similarly, with networked computers, administrators can control and manage the devices, users and other resources. Likewise, library can reduce the cost of acquiring multiple devices, applications or resources by sharing it on a single computer for multiple access simultaneously within the network [3]. Therefore, the overall objective of PACs [4] is to promote the right of access to information, modern technology, and services through universality and usability. This objective ensures the provision of enhanced and expanded information services, broader visibility, and improved reputation in the community and greater job satisfaction.

Provision of PACs

Library automation, emergence of internet and digital resources coupled with the keen interest of libraries in proving unlimited access to resources led to the provision of PACs in Libraries. Now most libraries recognized the importance of PACs in providing excellent service to their users. The importance of public computers in libraries cannot be over emphasized. In 2002, The International Federation of Library Associations and Institutions (IFLA) issued a manifesto for access to the Internet and other resources in libraries and information centers [5]. These declaration mandated libraries to provide internet and other information services in their communities. Therefore, libraries provide PACs to facilitate the access to not only information but to both hardware such as printers, scanners, storages, and software, such as Library Integrated Systems (LIS), library applications, network-based applications, open and Microsoft Office facilities and so on.

It is quite clear that the backbone services of PACs are the provision of access to information, sharing of internet connection, digital resources, library catalogue (OPAC) among

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others.

When the application of technology in libraries is being discussed, the first thing that comes to mind is the computer Ukoh [6], because of the nature of information services provided in academic libraries and the sophistication of today users. PACs are now globally considered as an integral part of library services. According to [7], group of public computers were provided to the University of North Carolina-Chartlotte (UNCC) for more than decades. Libraries in Nigeria installed number of public computers for access to the Internet, digital resources, software and other services. While some libraries offer limited time for access to the computers and services, others provide some reprographic services free or at subsidized rate [3]. Abubakar [8] reported that computers, the internet, and CDs were provided for the public use in six Nigerian university libraries. Iwu and Yusuf [9] reported that OPACs computers are being used to locate the material on shelves at Covenant University. Similarly, [10] discovered ICT Infrastructure and resources available at John Harris and Benson Idahosa University libraries such as computers, online databases, and the internet. However, [11] identified inadequate ICT infrastructure as problems in academic libraries in Nigeria.

Services of PACs

PACs in academic libraries play a significant role in bridging the digital divide by facilitating access to current information and creating an opportunity for understanding the latest technological development and services. According to a study by the American Libraries Association (ALA) [12] on public funding and technology access, nearly 75% of Kentucky libraries provide free internet access. While examining the services of PACs, [13] stated that people use PACs for access to the internet for email, searching, social media, digital resources such as Amazon, Wikipedia, etc.

The findings of [14] and [15] showed that PACs are used mainly by acquiring new skills, assignments, and connecting with family and friends. Additionally, [16] affirmed that PACs were provided for skills development, exploring computers, and the internet. Parvyn [17] and Strover et al. [18] recognized that the demand for internet browsing, email, and computer training services was very high.

PACs also serve as a means for finding safety and shelter in terms of crisis such as natural disasters and other emergencies. For example, people have used PACs for asking for help and searching for missing family members in Jamaica [19], U.S [20], and Africa [21]. Granath & Samson [22] highlighted several services of PACs at the "University of Montana Library", USA include internet browsing, Microsoft Word, email, library catalog, library databases, and electronic reserve. Kentucky Library [23] stated that they provide access to the Kentucky Virtual Library (KYVL), catalog through Integrated Library System (ILS) and the Internet

Nwezeh [24] found out that the majority of staff and students use the internet for their research and projects at "Obafemi Awolowo University".

PACs offer a variety of services; however, users access only a few. Uses of PACs can be categorized as follows:
1. Internet and communication
2. Desktop publication
3. Access to resources
4. Use of Library Automation Software/OPAC
5. Training

Objective of the Study

The main objective of this study is to explore the practice of PACs in academic libraries in Kaduna State, Nigeria. The study specifically aimed to;
1. identify the number of public computers and tools available
2. determine the services offered by PACs and
3. explore problems faced during the administration of PACs in these libraries.

II. METHOD

Qualitative research approach is employed for this study. According to [25], qualitative research is a type of research that produces findings that were not derived from statistical techniques or process of quantification. The researcher decided on the qualitative research approach because it focuses on interpretation rather than quantification, based on orientation toward process rather than outcome, and is flexible in the process of conducting research.

Case study approach along with triangulation techniques was used to interpret the results. Thomas [26] viewed case study as an analysis of people, programmes, incidents or strategies that are investigated suing single or multiple approaches. The choice of case study became necessary because case study became "one of the most common ways to do qualitative inquiry" [27]. Patton [28] recommends triangulation because it improves the findings through the application of both qualitative and quantitative techniques.

Population

The study comprises seven academic libraries in higher institutions offering diploma and degree programmes in Kaduna State. In terms of the target population, all the 52 staff managing PACs in these libraries constituted the population of this study. Table I presents distribution of the participants across the libraries under study.

Sample

Because it is manageable, the entire population was purposively selected as a sample for the study.

Instruments for Data Collection

Interview was used as main instrument for data collection supported by observation. The researcher used semi-structured interview schedule to interview the staff responsible for the management of PACs in e-library, OPAC, and training units. These instruments were found appropriate because it will provide the researcher with rich qualitative data. According to [29], the interview is very useful since it can pursue defined issues and provide constructive solutions. Similarly, [30] stated that in conducting a case study, there is a need for some

structured interviews to ensure cross-case comparability.

TABLE I
POPULATION OF THE STUDY

S/N	TOI	NOI	Name of Institution	Name of Academic Library	Sections	NOS	Remarks
1	Universities	3	Ahmadu Bello University	Kashim Ibrahim Library	MTN, OPAC, CD Search, Internet Training	15	Federal
			Nigerian Defence Academy	Academy Library	E-Library – OPAC	6	Federal
			Kaduna State University	University Library	E-Library – OPAC	8	State
2	Colleges of Education	2	Federal College of Education, Zaria	College Library	Internet Unit	10	Federal
			Kaduna State College of Education, Kafanchan	College Library	E-Library	5	State
3	Polytechnics	2	Kaduna Polytechnic	Isa Kaita Library	E-Library	6	Federal
			Nuhu Bamalli Polytechnic, Zaria	Ambassad or Yahaya Aliyu Library	E-Library	2	State
			Total number of staff managing PACs = Population			52	

As collected from the staff from each library in their various sections.
Key: TOI-Types of Institution, NOI-Number of Institution, NOS-Number of Staff.

Interview

Because the researchers intended to collect the data from each library using the same approach, a general interview guide approach with standardized open-ended questions was adopted for data collection. This facilitated deeper understanding and gave the researcher more ability to get information from the participants, as well as provided handy questions that enabled smooth interview.

Observation

Observation was used to obtain first-hand information. PACs were physically inspected with the view of observing the nature of the hardware and software, and other aspects of the services. Field note was used to collect data from observation. Observation is one of the best instruments for assessing the PACs and their services since it provides the researcher with the real views of the phenomena.

Data Collection

The researcher personally visited each site selected for the study, during which the researcher sought interviews with the participants. The researcher spent four weeks before he successfully completed the data collection through interviews and observation. During the observation session, some of the PACs' activities and hardware and software configured and installed on PACs were physically checked.

The heads of each unit with the staff constituted the interviewees. Each participant was given a copy of the structured interview questions and each question was jointly discussed where the right response was agreed and indicated on the interview schedule.

III. DATA ANALYSIS

The data that were collected from the research instruments were organized for analysis and transcribed into different types, depending on the sources of information. The data were then tabulated where necessary and discussed descriptively.

The data collected were analysed under the followings subheadings:

Services Provided by PACs

To find out the services offered by PACs in academic libraries in Kaduna State, a research question was set up in which interviewees were requested to state the services offered through PACs in academic libraries. The services of PACs in academic libraries in Kaduna State are very wide and varied ranging from internet access, training to access to digital resources.

The result of the interview indicates that, PACs are generally provided for access to the internet, digital resources, and CDs in all the libraries studied. In addition, KIL, NDAL, and KASUL provide access to Library Catalogue. Also, KASUL, FCEL, IKL, AYAL and College of Education Library provide access to some productive software, Similarly, Kashim Ibrahim Library installed clusters of PACs for training services only. This confirmed the finding of [9] which stated that 61.9% of students at "Covenant University" use public computers to identify the location of books on the shelves. It is also in agreement with the findings of [10] which identified the services of PACs at "John Harris and Benson Idahosa University Libraries" such as access to Internet, resources on HDD and CDs drivers, and online database. This also supports the finding of [31] who affirmed that PACs were purposely provided for skills development.

Problems Encountered in the Administration of PACs

In order to identify the problems hindering the achievements of the objectives of PACs in academic libraries studied, the participants were asked to mention the problems encountered while administering PACs. Lists of relevant problems were provided for them to choose from. Their responses are shown in Table II.

Table II indicated that the highest problems experienced by all the academic libraries in Kaduna State are systems malfunctions and power failure followed by inadequate internet bandwidth and absence of training. Even though KIL seems to have no problem with internet bandwidth, it was later discovered that some sections suffer from low internet bandwidth. Inadequate number of computers and no user assistance appeared as the third most experienced problem on the table, while lack of skills from the users and Library policy problems came fourth. Although some participants admitted that PACs were not adequately used, lack of awareness from the users appeared less of the problem for many academic

libraries in Kaduna State, as it is the fifth problem on the table. Similarly, too much restrictions and absence of productive software appeared only once which makes it the problem with the lowest frequency. This tallied with the earlier findings of [32] and [33] that lack of technically experienced IT staff, limited ICT facilities and infrastructure, power supply, inadequate staff training opportunities, and slow Internet connection are some of the major challenges still facing the Nigerian academic libraries. It also agreed with the findings of [34] that lack of ICTs management policies in libraries, lack of skilled personnel, and shortage of technological literate manpower to manage the ICT facilities make ICT application to the Nigerian libraries difficult. It demonstrated that staff of the library may not be able to compete with other librarians around the world as such goals and objectives of their libraries may not be achieved in meeting the current, timely, and relevant information needs of their users.

TABLE II
PROBLEMS ENCOUNTERED IN ADMINISTRATION OF PACS

Problem encountered	KIL	NDAL	KASUL	FCEL	CEL	IKL	AYAL
Lack of awareness	X	X	X	X	X	✓	✓
Inadequate bandwidth	X	✓	✓	✓	✓	✓	✓
Inadequate no. of computers	✓	✓	✓	✓	X	X	X
Lack of skills	X	X	X	✓	✓	✓	X
Library Policy restrictions	✓	X	X	✓	✓		X
Power failure	✓	✓	✓	✓	✓	✓	✓
System malfunctions	✓	✓	✓	✓	✓	✓	✓
Too much system restrictions	✓	X	X	X	X	X	X
Absence of productive software	✓	X	X	X	X	X	X
Lack of user assistance	X	X	✓	✓	✓		✓
Lack of Training	X	✓	✓	✓	✓		✓

Key: ✓: Available, X: Not Available, KIL: Kashim Ibrahim Library (ABU), KASUL: Kaduna State University Library, NDAL: Nigerian Defence Academy Library, FCEL: Federal College of Education Library, CEL: State College of Education Library Gidan Waya, IKL: Isah Kaita Library (Kaduna Polytechnic), AYAL: Ambassador Yahaya Aliyu Library (Nuhu Bamalli Polytechnic).

Types of Hardware and Software Configured and Installed in PACS Venues

Hardware and software installed and configured on PACs play a significant role in tasks performed by computers. Therefore, to identify the types of hardware and software installed in PACs venues in the libraries studied, lists of suitable hardware and software configuration were provided during the interview, and participants were asked to indicate those available. The field note was also used during the observation sessions to note the number of computers, types of hardware, and software. Table III shows the result from both interviews and observation.

From Table III, all academic libraries studied have fifty and above computers available for access by the public, with KIL

having the highest number of 180 public computers, followed by KASUL with 139 computers. Therefore, on comparing the ratio of library users in the academic libraries studied with number of public computers available, the number is quite inadequate in these libraries. This implied that the ratio did not meet up with the National University Commission (NUC) ratio of 1:5 computer per users' standard.

TABLE III
NUMBER OF PACs PROVIDED

S/N	Name of Academic Library	Units	No. of PAC	Total
1	Kashim Ibrahim Library (ABU)	MTN NET-Library	130	180
		OPAC	10	
		CD Search	10	
		Internet Training	30	
2	Nigerian Defence Academy Library	E-Library	55	61
		OPAC	6	
3	Kaduna State University Library	E-Library	88	139
		OPAC	6	
		Old E-library	45	
4	Federal College of Education Library	Internet Unit	60	60
5	Kaduna State College of Education Library	E-Library	50	50
6	Isa Kaita Library (Kaduna Polytechnic)	E-Library	120	120
7	Ambassador Yahaya Aliyu Library (Nuhu Bamalli Polytechnic)	E-Library	100	100

To identify whether other devices were used to broaden the services of PACs by academic libraries studied; physical inspection was conducted during the observation session and the result shows that the academic libraries studied acquired some devices. Table IV shows the number of devices available in the libraries.

TABLE IV
OTHER DEVICES AVAILABLE IN PACs VENUES

Name of the Academic Library	Other computer peripherals on PACs		
	Printers	Scanners	Projectors
Kashim Ibrahim Library (ABU)	✓	✓	✓
Nigerian Defense Academy Library	✓	✓	✓
Kaduna State University Library	✓	✓	✓
Federal College of Education Library	✓	✓	✓
State College of Education Library	✓	X	X
Isah Kaita Library (Kaduna Polytechnic)	✓	✓	✓
Ambassador Yahaya Aliyu Library (Nuhu Bamalli Polytechnic)	✓	✓	✓

✓: Available, X: Not Available.

Printing and scanning are the most prominent services that users always demand. Therefore, it is not surprising, as indicated in Table IV, that all the libraries studied have most of the devices for these services. However, the result of physical inspection conducted shows that the SCE does not have scanners and projectors.

To find out the operating systems used on PACs, the participants were asked to identify the operating systems installed on PACs in their various libraries. The result of the interview was later confirmed during the observation session.

Both instruments indicated that all the libraries studied have some of their PACs with windows XP and very few of them have Windows 7 installed. It is rather unfortunate that at a time when most PACs venues are upgrading their operating system from Windows 8 to Windows 10, most the PACs in the academic libraries studied still runs with Windows XP and there is no plan for upgrading. In other words, there is no regular upgrade of the operating systems in the academic libraries studied.

The research question is structured to confirm if there are other educational software installed on PACs in academic libraries studied. Educational software is normally installed on PACs to assist users and researchers. The result of interview and that of observation through the field note presented on Table V revealed that there are various types of educational software in the libraries studied.

TABLE V
TYPES OF EDUCATIONAL SOFTWARE INSTALLED ON PACS

Name of the Academic Library	Types of educational software installed on PACs			
	Encarta	Encyclopedia	Offline database	Dictionaries
Kashim Ibrahim Library (ABU)	✓	✓	✓	✓
Nigerian Defense Academy Library	✓	✓	X	✓
Kaduna State University Library	✓	✓	✓	✓
Federal College of Education Library	✓	✓	X	✓
State College of Education Library	X	X	X	X
Isah Kaita Library (Kaduna Polytechnic)	✓	X	X	✓
Ambassador Yahaya Aliyu Library (Nuhu Bamalli Polytechnic)	X	✓	X	X

✓: Available, X: Not Available.

While most of the academic libraries studied had Encarta Dictionaries and Encyclopedia installed on their PACs, only KIL and KASUL have offline databases and e-resources that can be accessed locally within the Local Area Network (LAN). This implies that even if there is no internet connection these libraries can still function, and users can find their needs.

Controlling what users can access on PACs in libraries cannot be neglected in this study. To find out if the libraries studied used browser control software, participants were asked to indicate any software in use for that purpose, and the computers were physically inspected to ascertain the types of the control software installed on PACs.

The results of the interview and physical inspection show that only KIL uses browser control software to block some untrusted websites. Browser control software is very crucial for public computers as [35] claimed that public computers can crash if users are allowed to install untrusted software or visit untrusted locations. Therefore, the lack of browser control software in most of the academic libraries studied could be the reason of the frequent crash of the computers. It is important to note that browser control software is not only used to prevent the crash but can be used for banning access to unauthorized web sites and services, as well as for balancing the privilege

and equalizing the changes of download between users by giving them equal opportunity to open a certain number of pages at a given time. Hence installing browser control software is very important.

Antivirus is also a security software for avoiding data corruption, distortion, destruction, and systems crash. In line with the importance of this, respondents were asked during the interview session and later confirmed at the observation stage the types of antivirus installed on PACs of academic libraries studied. AVAST, KASPERSKY, McAfee, and NORTON were the most popular antivirus installed on PACs in all the academic libraries studied. However, the researcher also observed that most of the installed Antivirus are obsolete or free versions.

The study considered the drive protection software as the core of the PACs management software due to the role it plays in protecting computers from intended and unintended abuses. To identify the installed protection software on PACs in the academic libraries studied, the respondents were asked to mention the type of driver protection software installed on PACs in their libraries. The interview revealed that it is only KIL and KASUL that have deep freeze as Disk and System protection software installed on their PACs. The importance of driver and system protection software is that; as long as users are allowed to change the systems setting or download file for some reasons, the disk on PACs is not safe, as well as operating systems. The staff everyday will spend extra time on restoring the systems and deleting the downloaded files unnecessarily. Instead, the drive and systems protection software will automatically restore the systems to the initial setting and delete all the downloaded files upon every restart. This will always keep the stable, constant, and unique setting on all the PACs.

Library installed time and session manager on PACs to manage the access to a computer and give the users equal opportunity to use the available computers. To find out if the academic libraries studied have installed time management software, a list is provided to the participants to tick the applicable software in their respective libraries. During the interview, the researcher discovered that the MTN Net library Unit of KIL uses Technocrat while KASUL uses Microtick as a time limit manager to grant access to users for a defined time.

The study further intent to investigate print management software installed on PACs in academic libraries studied. To achieve that, a list was provided to the participants to select the installed print management software on PACs in their libraries. All the interviewees admitted that they do not use any print management software for controlling printing in their libraries. The implication is that the profitable management of PACs cannot be fully achieved without using print management software. Wayne [36] affirmed that print management software helps in reducing the wasted papers, ink cartridges and make printing cost recovery more efficient.

IV. CONCLUSION

From the finding of this study, it can be concluded that

several PACs were provided for internet browsing, access to digital resources, and OPAC rather than training or access educational and productive software in the academic libraries studied. Uses of PACs encountered some hindrances which include inadequate provision of services, security vulnerabilities, users' privilege abuses, and systems malfunctions.

V. RECOMMENDATIONS

The study recommends that:

1. To satisfy the needs and preferences of the users, the academic libraries studied should provide PACs for all services including typesetting and access to productive and educational software.

2. Given the importance of current and relevant information in any library, the libraries should upgrade the available PACs and provide more public computers. This will enable the libraries to offer more time for access to computers and to give equal opportunity to their users.

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