

Obstacles Confronting Postgraduate and Undergraduate Students in Utilizing and Accessing Academic Library Resources: A Case Study

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ABSTRACT The study set out to investigate the impediments confronting both postgraduate and undergraduate students in utilizing and accessing library resources in South Africa. The objective of this paper was to investigate the impediments confronting both postgraduate and undergraduate students in utilizing and accessing library resources. This paper used a literature review methodology, presented the findings and made recommendations to the government pertaining to various actions that should be taken in order to ensure that both postgraduate and undergraduate students have access to library resources and at the same time able to utilize Internet facilities within the campus vicinity. The findings from this studies revealed that the majority of both postgraduate and undergraduate students were affected by poor facilities such as fluctuation of the Internet and unstable wireless network, and inadequate access to current published materials like books. The paper recommended that the government should collaborate with other government organizations and Non-Governmental Organizations (NGOs) by informing and educating them on the need to support her in order to enable her effectively, finance and provide conducive library resources, enabling access, and reading facilities to the students in various tertiary institutions of learning.

INTRODUCTION

Library resources play an important role in facilitating learning in all the academic institutions across the globe (Altbach and Teichler 2001; Biddiscombe 2002; Paul 2016). The view of access to and utilization of the library resources by both postgraduate and undergraduate students in developed countries cannot be quantified or compared to the rate at which the students in higher education of learning in developing countries access and used the library resources. Arguably, there are wide gaps between the access and uses of library resources in developed countries. Interestingly, it is very important at this

point to state that the higher institutions of learning in developed countries have gone extra miles in structuring their academic libraries in such a way that different academic users in their various institutions can easily access different published materials electronically. Additionally, some higher institutions of learning in African countries are yet to emulate the rate at which the developed countries have been making best used of their academic library resources (Rivers et al. 2016).

Although South Africa has attempted to bridge the digital divide, which includes a program developed in Durban, yet the access rate to information is still low. This is due to low access to technology and a lack of documented cultural heritage, which motivated the creation of an online indigenous digital library as part of public library services (Greyling and Zulu 2010). By critically examining some academic libraries in most of the higher institutions of learning in African countries such as Nigeria and South Africa among others, it is assumed that inadequate Information and Communication Technolo-

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gy (ICT) skills personnel was one of the most important obstacles facing them (Baro and Eze 2015; Rivers et al. 2016). By positioning some qualified ICT skills personnel to manage many strategic positions at the academic libraries would assist in ensuring adequate control, evaluation and monitoring of the academic library resources. It would assist these personnel to know which latest books or articles are expected to be ordered for or rejected at a crucial moment. These personnel could easily use his or her skills to determine how many published books or articles could be subscribed for over a period of time bearing in mind of the budget allocated to execute this project.

Interestingly, many higher institutions of learning have embarked on digitization of many published materials (Hayden et al. 2016; Levenson 2016), to the extent that they are presently subscribing to many publishers' database instead of subscribing or buying books and/or ordering for published articles. Many researchers of this related topic have therefore argued that investing heavily or hugely into the database of several publishers of books and articles could be too expensive (Smith and Smith 2016). In contrary to this view, some researchers expressed their view that subscribing into the publishers of academic books and journals is the best and in fact, they emphasized that most of all the higher institutions of learning in the developed countries subscribe hugely into the database of many publishers and all these were easily made accessible to and usable by their academic users. The authors of this paper therefore, believe that various higher institutions of learning in South Africa can choose any of the options suggested in order to meet the required demand of their postgraduate and undergraduate students and improve access and use of library resources.

Furthermore, inadequate spaces for the installations of various library resources have been seen as another challenge facing many established academic library resources in most of the higher institutions of learning in South Africa (Phukubje and Ngoepe 2016) and these have adverse effects on learning. Many postgraduate and undergraduate students suffered immensely in submitting their research assignment or proposal due to inadequate computers within their academic library institutions. Realistically, there are inadequate spaces that could accom-

modate a huge number of both undergraduate and postgraduate students in some higher institutions of learning in developing countries (Ali and King 2015). In fact, a few facts about the higher institutions academic library in South Africa is that they often use the "first come first serve approach" for issuing library books to students, which serves as an advantage to some students and disadvantage to others who could not have access to theirs. The implication of this disadvantage to students is that it ultimately prevented them from getting their work done and submitted on time.

The role of the Internet in accessing and using library resources cannot be overemphasized in any higher institution of learning in South Africa. Unquestionably, the greatest impediment facing the both undergraduate and postgraduate students in accessing and using library resources is Internet (Israel 2015; Kronenfeld and Bright 2015; Nazir 2015). Internet facilities have been one of the major challenges that have not been adequately rectified to sooth the purpose of academic or students' accessibility to information.

Objective of the Study

To find out the major problems facing both postgraduate and undergraduate students in accessing and using academic library resources.

Research Question

What are the major barriers facing both postgraduates and undergraduates students in accessing and using available information resources at the academic library?

Problem Statement

Many academic libraries in the tertiary institutions of learning in African countries including South Africa have improved tremendously due to some innovation made to improve both undergraduate and postgraduate academic learning, and yet, some tertiary institutions are still facing some internal crisis in relation to access and use of library resources. Some of the recent challenges include lack of qualified IT (Information Technology) skills personnel, and irregular functioning of some library resources such as computers. In addition, some of the computers

are obsolete versions. These have resulted in a slow rate of access and use of quick information for research and students' assignment that may require a certain due date for submission. Sadly, some students often fail due to some poor library academic environment, which is not conducive for learning such as inadequate furnished furniture, which could made learning comfortable to students. Some students are often stranded to secure a place to seat at some of these academic libraries in order to access and use library resources. Installations of various library resources or facilities such as the Internet have been seen as another challenge facing access and use of library resources in some tertiary institutions of learning in South Africa. Therefore, there is a need for the government to urgently intervene in order to reduce or improve some of these impediments confronting some tertiary institutions in South Africa.

METHODOLOGY

This paper used a review of literature from journals, books, dissertations and Internet sources. Also, the researchers used their experience and knowledge in Library and Information Science (LIS) and Public Administration discourses on issues pertaining to the challenges faced by academic libraries in accessing and utilizing information in some higher institution of learning in South Africa.

OBSERVATIONS AND DISCUSSION

Academic Library

Jonathan (2012) states that "the libraries help students learn when they are away from their teachers, which reflects in the library's dedication to the section, organization, preservation, socialization and making available for use of the information and essential knowledge of earlier generation to the latter one. Library is an instrument for all purposes of other institutions and agencies. It is also an institution in its own right in the community". It is close to the people and it is there to help them, it is also an active and skillful agent to promote basis, which exemplifies education for individual fulfillment on the one hand and the general of welfare of society on the other.

Agyen-Gyasi et al. (2010) state that academic libraries are important providers to information and assist a wide range of information seekers since they provide a place for students and other users to do their research and progress their knowledge. Maitaouthong (2012) also noted that academic libraries help in finding, using and understanding applicable information that opens up chances for lifelong learning, literacy enhancement, informed citizenship, recreation, creative imagination, individual research, critical thinking, and ultimately, empowerment in an increasingly complex world. The equitable access to information is essential to enable educated and informed citizens to participate in a democratic global community. The fundamental role of any academic library is to collect, process and store, disseminate and utilize information to provide services to the academic and research community. A well-stocked academic library is a storehouse of information, or a record of human experience to which users may turn to for data or information. Academic libraries generally contribute to the total development of the teachers and students in no small measure (Khan 2014).

Information

Ajiboye (2007) indicated that information is a data that has been subjected to some processing functions capable of answering user's query be it recorded, summarized, or simply collected that would help decision-making. It is well understood in terms of books, journals, magazines, public and private sector documents of all kinds, whether published for mass circulation or unpublished and restricted or confidential in nature, results of research efforts, which are made available to users in form of reports, books articles and non-printed materials.

Access

It is noted that not many students are aware of the new technologies such as databases and in fact, they do not know how to get to databases that are relevant for their particular field or sometimes when accessing information, they may find that the university is not subscribed to that particular database. Somi (2004) noted that "students do not seem to be very confident in using the Online Public Access Catalogue

(OPAC). However, students should be stimulated on how to use OPAC before browsing on the shelves and also for information to be retrieved, students are essential to be information literate. It is a responsibility of all academic libraries to equip students with the needed information skills to function effectively and to meet challenges of the information age". Anafo and Filson (2014) argue that students are not able to access relevant information because of lack of skills in terms of concept identification, search strategies, information sources, proper use of library catalogue, ethical and legal use of information, and it is a fact that these deficiencies on the part of the majority of the students could negatively affect the teaching and learning process.

Emmanuel and Jegede (2011), who conducted a research study on information needs and information seeking behavior and use of information resources by students, claim that students are complaining about the energy and time wasted by accessing information. Students need training and assistance on how to access and use information through databases as well as OPAC effectively and efficiently from the university librarians. Sometimes information may be not easily accessible at the university library due to the student's failure to access information resources or libraries failure to deliver needed materials to student. Ugah (2008) noted that "there are two kinds of failure in the library use. These include the library failure and student's failure. One of the most important library failures include failure to acquire or produce the materials needed by the students while the students' failure involved bibliographical and physical aspects. The bibliographical aspect involves the students' inability to find the item sought in the library catalogue. The physical aspects involved the failure to find the material housed in the library".

Oyewusi (2009) believes that the reason for inaccessibility is that users do not know exactly what they want, and if they do, they cannot talk about their needs accurately to the library staff. The bibliographic or intellectual access to the content of the library is inadequate owing to poor indexing system in the library on the library catalogue or on the library collection itself. The circulation policy of the library is inefficient, shelving methods are inadvertent and guides to the library arrangement are lacking. Unnecessary physical and administrative barri-

ers are imposed upon the use of the library material by the library management.

Ugah (2008) argues further that failure to find information material on the shelves has been bibliographically identified in the library catalogue is a common frustration and a challenge to library management, this can be because there is no indication on the library catalogue or that item is lost, sent to bindery for repair, and weeded or stolen. Sometimes, items may be incorrectly shelved due to lack of cognizant observations. Library staff may have removed materials for their private use or that of their relatives, friends and associates. Other significance includes circulation policies and insufficient loan system. Omeluzor et al. (2013) revealed that "library resources are not easily accessible to the students due to inadequacies emanating from out-datedness of resources, ineffective bibliographic organization and ineffective library services. Vor dem Berge et al. (2015) noted that library users could be served better if there is a possibility for them to have access to other library collections through resource sharing and the use of electronic databases".

Availability

Some materials at the library are available on OPAC but not available on the shelves, which make it difficult for the students to get them. Other materials are available both on OPAC and on the shelves but they are either damaged or have some missing papers. Adeoye and Popoola (2011) noted that resources may be available and even identified bibliography as relevant to one's subject of interest but users may not be able to lay hands on them. This may be due to the fact that information resources are in a special collection, and as a result, they can be closed to the users or may be unknown since there is no indication that user education was conducted to inform the library users.

Use

Nwobasi et al. (2013) pointed out that students use information in updating knowledge and development of personal competencies, when conducting a research, development of personal competencies and writing of assignment. It should be noted that various types of information resources mostly consulted by stu-

dents are textbooks, periodical journals, reference books and project report although many students are affected by insufficient information resources, inadequate qualified librarians and lack of time to access the information resources. Clifford and Obadare (2014) argue that no matter how rich a library collection may be, it is said that if the users do not effectively make use of them, the library collection is regarded as a waste.

Challenges in Accessing and Using Information at Academic Libraries

According to the recent studies conducted, there are many challenges facing many post-graduate and undergraduate students in accessing and using information at academic libraries. For instance, Benard and Dulle (2014) revealed that lack of professional staffs is the main challenge in many libraries, therefore, it is difficult for students to access the right information at right time and get right guidance on how to find and use information in such libraries because the information resources like textbooks are just scattered over the tables and others to the shelves and most of them are not catalogued and even classified.

According to the information gathered by Anafo and Filson (2014), sometimes students' challenges can be caused by inadequate knowledge on how to search for information from the library catalogue. They even fail to differentiate between library catalogue and bibliographic database, and for that reason, failure to know search strategies may results in the inability to retrieve relevant information.

Somi (2004) also mentioned some of the problems facing academic libraries include loan period, books are placed on short loan to allow all students to access them and other students on the other hand keep the materials for longer period of time while others are suffering, this is because libraries do not have enough materials to support the student's information needs. "A good library must make sure that there are books and extra copies that are placed on the shelves not on short-loan only but could be digitalized for the purpose of making information accessible through the use of computer. Another challenge facing academic libraries include the increasing cost of reading resources and limited budget that reduce the amount of learning materials to be acquired, increasing students and limited skills required to access and utilizing information" (Thanuskodi 2013).

In addition, Somi (2004) also points out that another challenge confronting academic libraries is the discovery of new technologies, and on the other hand, Benard and Dulle (2014) noted that these challenges are caused by scarcity of current readings and research material, inadequacy of computers as well as slow Internet connectivity. Urhiewhu (2014) included that the challenges are even caused by the insufficient computers with Internet facilities, incessant power outage, slow Internet connectivity, difficulty in finding relevant information, and lack of ICT skills. Okafor (2011) states that "libraries do not frequently meet the academic need, and this may be due to lack of current printed library resources especially the professional journals or due to lack of computer services including the Internet or inability of the librarians to provide the required information".

Challenges Confronting Undergraduate and Postgraduate Students and Academic Library Staffs in Accessing and Using Academic Library Resources in the Tertiary Institutions of Learning

The review of the study conducted by Ngcongolo at the University of Fort Hare (UFH) library in 2015 shows that both undergraduate and postgraduate students encountered the following problems (Ngcongolo 2015).

Books Being Lost or Damaged

Some of the challenges faced by many students in order to access and use the library information were due to loss of many academic books or damage. The majority (95%) of the respondents said that the library information is not enough, as they find it difficult to get relevant books for the information needed. The respondents also said that the information available in the library is either damaged or have some missing papers.

Lack of Current Information Material

There are little or no current materials available at the library. The finding shows that the students often complain that the relevant books

for their assignments and research topics are either not available or too old. Therefore, the result shows that the library has little or no current information materials for the students.

Bad Arrangement or Mixed Up Information Material

The books in the shelves are usually not properly arranged according to their order, which then makes it difficult to find book(s) they are looking for. Observably, not all materials are available at the library or some of the materials are specifically available in Online Public Access Catalogue (OPAC) but not available on the shelves, which make it difficult to find them to access and use for their research work.

Books Being Checked Out

The finding also shows that the books that are in demand are few as a result those books are always placed on short loan. Therefore, many students are unable to use those books.

Slow Internet Connectivity

The finding reveals that sometimes library Internet is not working properly due to slow down of Internet connectivity, and as a result, the students are unable to access and use online information such as e-books.

Perception of the Majority of the Undergraduate and Postgraduate Students on Ways to Overcome Some of these Challenges

The following suggestions were revealed (Ngcongolo 2015):

- The library should ensure that all the information materials are available and accessible to the students and other users and also make sure that those materials especially books are being placed in a rightful manner.
- The library should digitize all books in order to have more services to offer regarding number of books. University students and other users will be able to access and use books from anywhere.

- All students should be taught how to use Online Public Access Catalogue (OPAC) so that they can use the library even from their rooms.
- The library should fix the computers that are not working and get more computers and there should be a computer lab for both undergraduate and postgraduate students at the library so that if the books are checked out, there will be a backup for students who do not have laptops.
- They also suggested that more employees are needed so that they can collect all the books, which are left in the desks by students and arranged them in their shelves for quick accessibility.
- The library should provide recent information materials and notify students and other users on new arrival of the new information resources or there should be an interesting display of new books on the new arrival display rack.

CONCLUSION

The study has revealed that most of the undergraduate and postgraduate students often find it difficult to access and use the information in the academic library due to lack of information resources in the library such as obsolete published materials and when the item is being checked out, there are some instances of network failure. With this view, most of the undergraduate and postgraduate students are often not satisfied with the library Internet. Furthermore, the majority of the students do not understand the need of using the library since library lacks information resources. Importantly, students need library information resources to satisfy their academic needs. However, the library activities would fail if both undergraduate and postgraduate students were not able to access and use available information resources to carrying out their assignments. An academic library is one of the major sources of information for students, therefore, the UFH library should fulfil students' information needs by means of donating, purchasing and providing new information resources such as books and academic journals in order to replace some of the obsolete ones available in the shelves and also ensure effective and efficient internet access to students and other users.

RECOMMENDATIONS

- The UFH management should ensure that the library is properly funded in terms of the university's overall budget allocation.
- The government should purchase and ensure that all the academic libraries have recent books and academic journals in order to facilitate successful learning.
- The UFH executive should always ensure that the Internet facilities are improved and constantly available for all the users.
- The University management should also encourage the University Library to organize several training, workshops and seminars for the purpose of creating new awareness of essential information, increasing and improving academic skills and new knowledge that could be of benefit to the library users in their academic research.

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REFERENCES

- Adeoye MO, Popoola SO 2011. Teaching Effectiveness, Availability, Accessibility, and Use of Library and Information Resources among Teaching Staff of Schools of Nursing in Osun and Oyo States, Library Philosophy and Practice. From </http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1556&context=libphilprac./> (Retrieved on 5 May 2017).
- Agyen-Gyasi K, Frempong A, Lamptey R 2010. Academic Librarians' Role in Maximizing Library Use in Ghana. Ghana: Kwame Nkrumah University of Science and Technology.
- Ajiboye JO, Tella A 2007. University Undergraduate Students' Information Seeking Behaviour: Implications for Quality in Higher Education in Africa. From <file:///C:/Users/201100592.UFHSTUDENT. 004/Documents/a413a3271eccda758080799e 818dd1b2%20(1).pdf> (Retrieved on 26 August 2016).
- Ali S, King A 2015. Study spaces and environments: Recognizing the needs of students in Africa. *Journal of Education and Practice*, 6(23): 99-107.
- Altbach PG, Teichler U 2001. Internationalization and exchanges in a globalized university. *Journal of Studies in International Education*, 5(1): 5-25.
- Anafo P, Filson CK 2014. Promoting Information Literacy among Undergraduate Students of Ashesi University College. Ghana: Library Philosophy and Practice.

- Baro EE, Eze ME 2015. Colleges of Education librarians in Nigeria: An investigation into the self-perception of ICT-related information literacy skills. *Communications in Information Literacy*, 9(2): 198.
- Benard R, Dulle F 2014. Assessment of Access and Use of School Library Information Resources by Secondary Schools Students in Morogoro Municipality, Tanzania. Tanzania: Library Philosophy and Practice
- Biddiscombe R 2002. Learning support professionals: The changing role of subject specialists in UK academic libraries. *Program*, 36(4): 228-235.
- Clifford BI, Obadare SO 2014. Availability, Access to and Level of Use of Academic Library Information Resources; Study of Selected Academic Libraries. From http://www.iiste.org/Journals/index.php/JEP/article/view/16121/16320 (Retrieved on 3 May 2017).
- Emmanuel OS, Jegede OR 2011. Information needs and information seeking behaviour and use of information resources by MBA students at a Nigerian university. *African Research Review*, 5(4): 250-264.
- Greyling E, Zulu S 2010. Content development in an indigenous digital library: A case study in community participation. *IFLA Journal*, 36(1): 30–39.
- Hayden J, Monson JD, Trask EJ 2016. Strengthening archival digitization efforts with an interdepartmental approach: A case study. *Journal of Western Archives*, 7(1): 1-14.
- Israel O 2015. Undergraduates' Computer Skills and the Use of Online Information Resources: A Case Study of Library and Information Science Students of Delta State University, Nigeria. From http://search.proquest.com/openview/ce1b826bdb 0585d 1a98a8d202ce8def3/1?pq-origsite= gscholar &cbl= 1246355> (Retrieved on 1 May 2017).
- Jonathan EM 2012. The Importance of Academic Library to Nigerian Students. From http://works.bepress.com/cgi/viewcontent.cgi?article=1001&context=moses_ehindero (Retrieved on 2 May 2017).
- Khan A, Bhatti R, Khan G, Ismail M 2014. The role of academic libraries in facilitating undergraduate and post-graduate studies: A case study of the University of Peshawar, Pakistan. *Chinese Librarianship:* An International Electronic Journal, 38: 36-49.
- Kronenfeld MR, Bright HS 2015. Library resource discovery. Journal of the Medical Library Association, 103(4): 210.
- Levenson HN 2016. Collaborative weeding among public university libraries can lead to cost savings for all. In: Brian Doherty (Ed.): Space and Organizational Considerations in Academic Library Partnerships and Collaborations. USA: IGI Global, P. 130.
- Maitaouthong T, Tuamsuk K, Tachamanee Y 2012. The roles of university libraries in supporting the integration of information literacy in the course instruction. *Malaysian Journal of Library & Information Science*, 17(1): 51-64.
- Nazir T 2015. Use and Adequacy of E-resources by the Research Scholars and Students of the University of Kashmir in Science & Social Science Faculties: A Case Study. From http://crawl.prod.proquest.com.s3.amazonaws.com/fpcache/8cefa2d 15894a1ece 87c71ffedbeee51. pdf? AWS Access KeyId= AKIAJF7V7 KNV2KKY 2NU Q&Expires=1 47220

- 2051 & Signature = 1AJ BXYGImd DHf8 Qjpdug VWyeLeo%3D> (Retrieved on 1 May 2017).
- Ngcongolo B 2015. Access to and Use of Information at Academic Libraries: A Case Study of the University of Fort Hare Library. Honours Project, Unpublished. Alice: University of Fort Hare.
- Nwobasi RN, Ossai-Onah OV, Uwa EO 2013. Information Needs and Seeking Behaviour of Students in Two Universities in Imo State, Nigeria. Nigeria: Library Philosophy and Practice.
- Okafor VN 2011. Access to research information in cybercafés: The challenge to academic libraries. *Library Philosophy and Practice*, 1: 88.
- Omeluzor SU, Bamidele IA, Onuoha UD, Alarape AA 2013. Information literacy skills among postgraduate students of Babcock University, Nigeria. International Journal of Innovative Research in Management, 2(12): 1-18.
- Oyewusi FO, Oyeboade SA 2009. An empirical study of accessibility and use of library resources by undergraduates in a Nigerian State University of Technology. *Library Philosophy and Practice (E-journal)*, Paper 277, pp. 1-10.
 Phukubje J, Ngoepe M 2016. Convenience and Accessi-
- Phukubje J, Ngoepe M 2016. Convenience and Accessibility of Library Services to Students with Disabilities at the University of Limpopo in South Africa. From http://lis.sagepub.com/content/early/2016/06/29/0961000616654959.full.pdf+html (Retrieved on 12 August 2016).
- Paul PP 2016. University Libraries Support Initiative for E-Learning in North-Central Zone of Nigeria. PhD Thesis, Unpublished. Enugun: University of Nigeria Nsuka

- Rivers PA, Rivers JK, Hazell V 2016. Africa and technology in higher education: Trends, challenges, and promise. *International Journal for Innovation Education and Research*, 3(5): 14-31.
- Smith MM, Smith JA 2016. What's the use? A costper-use study of selected business databases. *Inter*national Information & Library Review, 48(1): 11-20
- Somi NG 2004. The Role Played by Academic Libraries in the Enhancement of Information Literacy: A Study of Fort Hare Library. PhD Thesis, Unpublished. Rondebosch: University of Cape Town.
- Thanuskodi S 2013. Challenges of Academic Library Management in Developing Countries. India: Ulagappa University.
- Ugah AD 2008. Availability and Accessibility of Information Sources and the Use of Library Services at Michael Okpara University of Agriculture. From http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1195&context=libphilprac (Retrieved on 10 December 2015).
- Urhiewhu LO 2014. Availability and Use of Digital Information Resources by Undergraduates of Universities in Delta and Edo States, Nigeria. PhD Thesis, Unpublished. Awka: Nnamdi Azikiwe University.
- Vor dem Berge M, Buchholz J, Cupertino L, Da Costa G, Donoghue A, Gallizo G, Jarus M, Lopez L, Oleksiak A, Pages E, Pi¹tek W 2015. CoolEmAll: Models and Tools for Planning and Operating Energy Efficient Data Centres. New York: Springer.

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