AWARENESS, AVAILABILITYAND ADOPTION OF MAKERSPACE AS A TOOL FOR STAFF DEVELOPMENT IN FEDERAL UNIVERSITY LIBRARIES IN NORTHERN NIGERIA

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Abstract

This study investigated awareness, availability and adoption of makerspace as a tool for staff development in Federal University Libraries in Northern Nigeria.The study adopted a descriptive survey research design. The population of the study comprised of seven hundred and ten (710) librarians. The entire population was adopted for the study. The instrument for data collection was a structured questionnaire titled "Librarians Awareness of Makerspace Questionnaire" (LAMQ). The instrument was trial tested by administering it to 40 librarians in four (4) State universities that are not part of the main study. The result of the reliability coefficient was found to be 0.82, this was good enough for the instrument to be considered reliable.Seven hundred and ten (710) copies of questionnaire were administered to librarians via e-mail and WhatsApp platforms, out of which seven hundred (700) copies of questionnaire were retrieved and returned for use which represent 98.6% response rate. The data collected were tabulated and analyzed using frequency counts and percentages. The findings revealed that majority of the respondents were aware of the makerspace, none of the university libraries under study have a makerspace and majority of the respondents had positive opinion on the adoption of makerspacefor staff development in university libraries. The study recommended among others that Management of university libraries should strategies ways of using available spaces or create space by decongesting already existed spaces in the libraries to give way for creation of makerspaces to collaborate with other existing learning centres such as workstations and workrooms for effective and productive learning.
Keywords: *Adoption, Availability, Awareness; Federal University Libraries, Makerspace, Staff Development, Tool, Northern Nigeria.*

Introduction

University libraries are established to support teaching, learning, research and services functions of their parent institutions. For university libraries to achieve these, library management is expected to give adequate attention to staff development by adopting the use of Makerspace as the new emerging trend of learning new skills.Staff development is concerned with activities that focus on improving the job knowledge, skills, performance and productivity of the library staff. According to Ifidon and Ifidon (2007) cited in Saidu, Saka and Kur (2020), staff development encompasses formal education, seminar, conferences, workshops, in-house training and participative management. Makerspace is a community platform that provides science, technology, engineering and educational opportunities for people in the society to learned new skills and gained knowledge. These enable community members to make prototype,manufacture items and design using devices that would be accessible or affordable such as computer-aided design (CAD) software, digital fabrication machines and 3-D printers (Canessa, Fonda and Zennaro, 2013). This technology also applies in the libraries in terms of staff development.

The concept of makerspaces was defined by Hussain and Nisha (2017)as a physical location embedded to shareresources and knowledge, work on, network, projects by different people from different academic background. It is a hub to create, invent, tinker, explore and discover using a variety of tools and materials to develop certain skills. it may also be pronounced as a community center that provides technology, manufacturing equipment and educational opportunities to the public; things accessible or unaffordable such as 3-D printers, and computer-aided design (CAD) software. Consequently, makerspaces are of various types such as municipalities', universities, educational school boardsand local communities. The community atmosphere ofthe space allows people to learn from each other and experiment rather than receive lessons.Makerspaces are

generally funded by membership fees or through affiliations with external organisations, such as universities, for-profit companies, non-profit organisations and libraries (Ibrahim and Tsagem, 2019).

Okuonghae, (2019) asserted that the availability of makerspace gives the library user the opportunity to create something out of nothing and help them to explore their own area of interest. It also helps to prepare library users for 21st century skills in the fields of science, technology, engineering and mathematics (STEM). They provide hands on learning, critical thinking skills and even boost self-confidence. Some of the skills that are learned in a makerspace pertain to electronics, 3D printing, 3D modeling, coding, robotics and even woodworking. Open Education Database (2016) state that since the first official makerspace convened in a library in upstate New York in 2010, libraries have remained an ideal setting for makerspace events in America. The increasing adoption of makerspaces by libraries having creative spaces for hands-on-work would no doubt further position libraries as gateways for new skills and knowledge (NMC Horizon Report, 2015). Consequently, the report further stated that makerspaces are cropping up in libraries everywhere, but the process for creating one of these areas in an academic library can often be layered and confusing. This is especially true for librarians and staff that have had very little prior makerspaces experience. A factor that can make the process even more difficult is the lack of agreement over what exactly a makerspace is (Association of College and Research Libraries (2016) cited in Kalu and Chinyere, 2019).

For the purpose of this study, university libraries are the focal point of discussion. However, the study is an effort to understand the concept as regards to awareness, availability and adoption of library makerspaces among librariansin federal university libraries in Northern Nigeria and the way they perceive the concept. It further examines the advantagesarised from makerspaces and facilities offered as it helps professionals to meet the changing demands of clienteles and achieve academic endevours.

University makerspaces are places where students and staff can learn new things, work with their peers, consider new ideas, explore, tinker, invent and make. The future of libraries is about a user community engaging to create content and using it for community building, connecting people, engaging students, assisting researchers, and advancing knowledge production (Filar and Folkman, 2017).Makerspaces provide an opportunity for libraries to build upon services they already offer while reaching out to students and faculty who do not frequent the library on a daily basis. By implementing a makerspace in the campus library, the space is seen as more neutral and approachable by students and staff from all academic departments. Broadly interpreting what a makerspace needs to be, allows institutions the opportunity to match the space to the specific needs of their student body, while leaving room for the space to change and grow over time. The smaller scale implementation of makerspaces and collaboration technology provide institutions with a testing ground for future trends and can encourage academic departments to independently adopt new instruction trends in the classroom. In addition to the services provided by the space, students benefit from the opportunity to participate in a more creative, kinesthetic style of learning that stimulates their decision-making skills (Lee, 2017).

The notion of makerspaces has been gaining momentum andfast being adopted in various educational institutions all over the world. In United States of America, there arequite a number of institutions that have adopted makerspace as a platform for providing experimental hands on experiences for learners and also an instrument for increasing creativity and encouraging innovation. Some of these institutions include: University of Ottawa's Richard L'Abbe Makerspace, which was established in 2014; the Invention Studio at Georgia Tech, Taubman School of Architecture's FabLab, University of Victoria Make Lab.In Nigeria, the level of adoption of makerspaces is still at the early stage. Some of the notable makerspaces established in Nigeria include: Prikkie Academy makerspace establishedin September, 2017, Centre for Technical VocationEducation Training and Research Mobile College established in 2015 which serves as a mobile makerspace for University of Nigeria, Nsukka and University of Ibadan learning space. (Yusuf, Segun-Adeniran, Esse, Izuagbe, Iwu-James, Adebayo, Fagbohum, Olawoyin and Owalabi, 2019). With the full adoption of makerspace for learning

and teaching in Nigeria, the process of learning will take a new positive turn and this in the long run wouldbetter the Nigerian Economy. Makerspaces within the university are attractive means for answering the need for more practice-based programmes or courses that complement the theoretical class structure that are already in place (Canessa, Fonda and Zennaro, 2013).

Statement of the Problem

University libraries are established to support teaching, learning, research and services functions of their parent institutions. For university libraries to achieve these, library management is expected to give adequate attention to staff development by adapting to the use of emerging trend called "Makerspaces". While academic libraries in America and other developed countries have started providing access to maker resources and services. In Nigeria, various studies conducted have shown clearly that there were very few academic libraries with makerspaces (Kalu and Chinyere, 2019) and Yusuf, Segun-Adeniran, Esse, Izuagbe, Iwu-James, Adebayo, Fagbohum, Olawoyin and Owalabi, 2019).The problem of academic libraries in Nigeria not having makerspaces at this present time of technological innovations is worrisome. Makerspace is anemerging trend that provides science, technology, engineering and educational opportunities for people in the society to learned new skills, share ideas and gained knowledge. This is also applicable in librarianship. However, one cannot conclude whether federal university libraries in Northern Nigeria were among the few academic libraries with makerspaces. It is against this backdrop that, this study is set to investigate the awareness, availability and adoption of makerspace in federal university libraries in Northern Nigeria.

Objectives of the Study

The objectives of the study are to:
1. ascertain librarians'awareness of the makerspace as a tool for staff development in federal university libraries in Northern Nigeria;
2. determine the availability of makerspace in federal university libraries in Northern Nigeria;
3. determine the opinions of librarians on the adoption of makerspaces in federal university libraries in Northern Nigeria.

Research Questions

The following research questions guided the study:
1. Are librarians in federal university libraries in Northern Nigeria aware of the makerspace?
2. Are there any federal university libraries in Northern Nigeria that have makerspaces?
3. What are the opinions of librarians on the adoption of makerspacesin federal university libraries in Northern Nigeria?

Literature Review

Kalu and Chinyere (2019) conducted a study on makerspace as an emerging trend in academic libraries: advocacy for adoption and domestication in Nigeria. Data were collected through interview schedule, 35 copies of interview schedule were distributed and administered to University Librarians via e-mail, telephone and face to face conversation. Data were analysed through simple percentage. The study reported that university librarians were aware of the makerspace concept as an emerging learning space in academic libraries; in all the one hundred and sixty-five (165) universities in Nigeria approved by National Universities Commission (NUC) which made up of federal, state and private, only two university libraries have makerspaces and the respondents have positive perspectives on the adoption and domestication of makerspace in academic libraries. The study advocates for University Libraries in Nigeria to embrace and explore the makerspace concept for adoption and domestication.

A study was conducted to examined the awareness and use of library makerspaces among professionals in Indian libraries. The objectives of the study were to: highlight the concept of makerspaces and its perceived benefits in Indian libraries, find out the awareness and purpose of makerspaces in libraries and among others. A well-structured questionnaire was used for collection of data. Online survey techniques were used for data collection.Around 700 questionnaires were distributed among the Indian library professionals. A total of 500 filled in questionnaires were received, out of which, only 470 questionnaires were selected for analysis of thedata. The overall response rate was 67.14 %. The result of the study demonstrates that among all users, 70% male and 30% female were aware of library's makerspaces. Majority of users utilising library makerspaces

are pursuing master's degree. It has been found that nearly all of the academic libraries employees were aware and already using makerspaces facilities. Maximum number of respondents' (68.09%) are using makerspaces facilities for academic and research purposes and reported them as a tool to educate students for the local and global economy (42.55%). 90% of respondents indicated that their library makerspaces launched recently in 2016. The study reported that library's makerspaces in India have computer workstations, offer students workshops/seminars/conferences and majority of the respondents (library professionals) understand the significance of library makerspaces and evaluated them as "valuable"(Hussain and Nisha, 2017).

Moorefield-Lang and Coker (2017) investigated makerspaces in the high school setting: the student perspective. The purpose of the study was to provide a look into the perceptions, both through text and image of public high school students who have a maker learning space in their high school library at Monticello High School in Charlottesville, Virginia. Purposeful sampling technique was used for the study.The rationale for the research was that, by obtaining a better understanding of student perceptions and perspectives, librarians and peer researchers in the field would gain a better comprehension in how students view their makerspace. Individual one-on-one interviews with student participants were used to move toward a thematic analysis of perspectives of makerspaces in a high school library setting.Thirteen participants were interviewed for the study. In addition to student interviews, images and photographs of the makerspace and student projects was alsoincluded in the study. The result showed that the makerspace at Monticello High School has multiple components and spaces included in its makeup. Students can create recordings in two separate music studios. They can build, make, and create in a designated open makerspace. The makerspace has a classroom with glass walls creatively called The Glass Room, a space educator can reserve for class and where students can write and design on the walls, the school librarians at Monticello have used the library space to enhance student curiosity and support learning and creativity. By using the area in this way and offering maker activities to students there can also be an increase in feelings of capability and confidence.

Barniskis (2016) conducted a study on creating space: The impact of spatial arrangement in public library makerspaces.Thestudy used multisite case study of ethnographic methods to explore users' impressions and interpretations of makerspaces by looking at two public libraries. The study research questions were: How do users and library personnel interpret the spatial arrangements of public library makerspaces and how do these spatial arrangements construct or reflect power relations between the library and the users, or impact what users may do.The study examines how the users and library staff perceive the spaces of library makerspaces and how the spaces reproduce power relations between users, staff, and the institution. The sites include one large urban and one small rural library. Data were collected and analysed through participation, observation and interviewing and inductively to seek out patterns of impacts and perceptions regarding the spatial arrangements of each makerspace. Result showed that each library presents different spatial arrangements, but they both suffer from lower usage than expected, in terms of either the amount or types of use. While patrons use the large urban library extensively, they are not collaborating as some staff expected andthe successes of the space in the eyes of the library staff and users are often made possible by spatial choices.

Ahn and Noh (2018) conducted a study and survey of the perception towards makerspaces of the public library. The study research questions were: Do public library librarians feel that it is necessary to introduce makerspace into public libraries, and if they do, why; what do public library librarians think of makerspaces' operational direction and support policy and what do public librarians think of the spreading structure of makerspace. The study adopted survey method to collect opinions on the creation and operation of public library makerspaces. Data were collected and analysed through survey questionnaire and frequency counts and percentage respectively. The study reported that majority of public librarians answered that they needed it while minority of the respondent said it was unnecessary, minority of the respondents who said that the introduction of makerspaces was unnecessary said that the additional introduction of new work in an environment where the current

work could not be faithfully performed will interfere with the current library work, followed by the impossibility of the introduction of the additional work with the current library space and manpower, and the lack of equipment and space.

Moorefield-Lang (2015) conducted a study on the change in the making: makerspaces and ever-changing landscape of libraries. The study adopted Purposeful sampling technique. Data were collected throughindividual one-on-one interview approach used to move toward a thematic analysis of how makerspaces were integrated in library settings. Interview respondents were librarians. Twelve librarians were interviewed for the study. Four were in k-12 school library settings, four in public library settings, and four in academic or university library settings. Eleven of the libraries were in the United States and one was in Canada.Data was analysed using Nvivo 10 qualitative data analysis software. The study reported that at the time when the interviews took place one librarian had already adopted her maker learning space the previous month, while a participating academic librarian had formed the makerspace or 3d printing lab ten years back and each librarian's experience varied when it comes to the realization of makerspaces.

Okuonghae (2019) investigated creating makerspaces in Nigerian libraries: Issues and Challenges. The study adopted a theoretical approach utilising data gathered through the content analysis of both primary and secondary sources such as: journals, textbooks and Internet resources. The study also explored makerspaces set-up requirements for Nigerian libraries, steps for developing makerspaces as well as the benefits of makerspaces to library users. Furthermore, the issues and challenges facing makerspaces in Nigerian libraries were extensively discussed. The study reported that makerspaces, in addition to building the critical thinking ability of citizens, will also foster the development of their interpersonal, communication, teamwork, leadership and mentoring skills.

The uniqueness of this study lies on the fact that it tries to investigate the awareness, availability and adoption of makerspaces in only federal university libraries ofa particular region of the country and used the entire librarians as the respondents. This is against the previous studies that concentrated on Nigerian libraries and all the universities in Nigeria and used only the university Librarians as the respondents.

Research Methodology
This study adopteda descriptive survey research design. The survey research design is used because survey type of research is characterized by population and sample as well as the use of data collection instrument. Mole (2019) defined descriptive survey research design as one which is aimed at collecting data from members of a given (usually large) population on their views, opinions, attitudes, beliefs, perceptions, among others on a phenomenon, event or practice in order to determine the characteristics, features or facts about the population.The population of the study comprised of seven hundred and ten (710) librarians. The entire population was adopted for the study. The instrument for data collection was a structured questionnaire titled "Librarians Awareness of Makerspace Questionnaire" (LAMQ) for librarians to express their opinions on the awareness, availability and adoption of makerspace in federal university libraries in Northern Nigeria. A total of seven hundred and ten (710) copies of questionnaire were administered to librarians via e-mail and WhatsApp platforms, out of which 700 copies of questionnaire were retrieved and returned representing 98.6% response rate. Data collected were tabulated and analysed using frequency counts and percentages. The instrument consisted of two part, part A seek demographic information of the respondents while part B was a Yes or No option which consisted of 3items covering the three area of the study namely: awareness of makerspace, availability of makerspace and adoption of makerspace. The instrument was trial tested by administering it to 40 librarians in four (4) State university libraries that were not part of the main study. Cronbach Alpha was used to ascertain the reliability of the instrument. The result of the reliability coefficient was found to be 0.82, this was good enough for the instrument to be considered reliable.

Results and Discussion

The response rate for the administered copies of the questionnaire used for this study is contained in Table 1.

Table 1: Response Rate of the Respondents by University Libraries

S/N	Federal University Libraries	Copies of Questionnaire Distributed	Copies of Questionnaire Returned	Percentage of copies returned (%)
1.	Kashim Ibrahim Library; Ahmadu Bello University, Zaria	193	189	98
2.	Federal University Library, Dutse	16	16	100
3.	Bayero University Library, Kano	101	99	98
4.	Federal University Library, Dutsin-ma	15	15	100
5.	Nigerian Defence Academy Library	27	26	96.3
6.	Abdullahi Fodiyo Library; Usmanu Danfodiyo University, Sokoto	16	16	100
7.	Federal University Library, Birnin Kebbi	23	23	100
8.	Federal University Library, Gusau	22	22	100
9.	Nigeria Police Academy Library, Wudil	16	16	100
10.	Federal University Library, Lokoja	11	11	100
11.	Federal University Library, Lafia	09	09	100
12.	Ibrahim Badamasi Babangida Library; Federal University of Technology, Minna	28	27	96.4
13.	University of Abuja Library, Gwagwalada	21	21	100
14.	Joseph SaawuanTarkaa University Library, Makurdi	24	24	100
15.	University of Jos Library, Jos	29	28	96.6
16.	University of Ilorin Library, Ilorin	25	25	100
17.	Federal University Library, Kashere	26	25	96.2
18.	Abubakar Tafawa Balewa University Library, Bauchi	19	19	100
19.	Ibrahim Babangida Library; Modibbo Adamawa University of Technology, Yola	25	25	100
20.	Ramat Library; University of Maiduguri Maiduguri	30	30	100
21.	Federal University Library, Wukari	12	12	100
22.	Federal University Library,Gashua	17	17	100
23.	Nigerian Army Universiy Library, Biu	05	05	100
	Total	**710**	**700**	**98.6**

Table 1 reveals that out of 710 copies ofthe questionnaire administered, 700 were retrieved, retuned and found usable. This represented a response rate of 98.6%. In Kashim Ibrahim Library; Ahmadu Bello University, Zaria, 193 copies of the questionnaire were administered, out of which 189(98%) were retrieved and used.In Bayero University Library, Kano, 101copies of the questionnaire were administered, out of which99(98%)were retrieved and used. In Nigerian Defence Academy Library, 27copies of the questionnaire were administered, out of which 26(96.3%)were retrieved and used. In Ibrahim Badamasi Babangida Library; Federal University of Technology, Minna, 28copies of the questionnaire were administered, out of which 27(96.4%) were retrieved and used. In University of Jos Library, Jos, 29 copies of the questionnaire were administered, out of which 28(96.6%) were retrieved and used. In Federal University Library, Kashere, 26copies of the questionnaire were administered, out of which 25(96.2%) were retrieved and used. In the other university libraries, all the copies of the questionnaire administered were retrieved and used. The distribution of the respondents by sex is presented in Table 2.

Table 2: Distribution of Respondents by Sex

S/N	Sex	Frequency	Percentage (%)
1	Male	386	55.1
2	Female	314	44.9
	Total	**700**	**100**

Table 2 reveals that 386(55.1%) of the respondents were males while 314(44.9%) were females. This implies that male and female respondents in the university libraries under study were fairly represented in the study.

Research Question One: Are librarians in federal university libraries in Northern Nigeria aware of the makerspace?.To answer this question frequency and percentage were used.

Table 3: Responses on Librarians awareness of the makerspace in federal university libraries in Northern Nigeria.

S/N	Statement	Aware F(%)	Not Aware F(%)	Total F(%)
1.	Librarians awareness of the makerspace	520(74.3%)	180(25.7%)	700(100%)
	Total	**520**	**180**	**700**

Finding from Table 3 reveals that majority 520(74.3%) of the respondents were aware of the makerspace while 180(25.7%) of the respondents were not aware of the makerspace in university libraries.

Research Question Two: Are there any federal university libraries in Northern Nigeria that have makerspaces?. To answer this question frequency and percentage were used.

Table 4: Responses on availability of makerspaces in federal university libraries in Northern Nigeria.

S/N	Statement	Yes (%)	No (%)
1.	Availability of makerspaces in federal university libraries in Northern Nigeria	0	700
	Total	**0**	**700(100%)**

Table 4 shows that 700(100%) of the entire respondents indicated none availability of the makerspace in the federal university libraries in Northern Nigeria.

Research Question Three: What are the opinions of librarians on the adoption of makerspaces in federal university libraries in Northern Nigeria?. To answer this question frequency and percentage were used.

Table 5: Responses on librarian's opinions on the adoption of makerspace in federal university libraries in Northern Nigeria.

S/N	Statement	No Opinion F(%)	Negative Opinion F(%)	Positive Opinion F(%)	Total (%)
1.	Librarians opinions on the adoption of makerspace in federal university libraries in Northern Nigeria	185(26.4%)	25(3.6%)	490(70%)	700(100%)
	Total	**185**	**25**	**490**	**700**

Table 5 shows that 185(26.4%) of the respondents had no opinion on the adoption of makerspace, 25(3.6%) of the respondents had negative opinion on the adoption of makerspace while 490(70%) of the respondents had positive opinion on the adoption of makerspace in university libraries.

Discussion of Findings

Research question one sought for librarian's awareness of the makerspaces in federal university libraries in Northern Nigeria. The result of the study revealed thatmajority 520(74.3%) of the respondents were aware of the makerspace in university libraries.This findingcorroborate the findings of Hussain and Nisha (2017) andKalu and Chinyere (2019) thatmajority of the librariansin academic librarieswere aware of the makerspaces concept.

Research question two sought for availability ofmakerspacesin federal university libraries in Northern Nigeria. The result showed that the entire respondents 700(100%) indicated none availability of the makerspace in the federal university libraries in Northern Nigeria. This finding does not corroborate

the findings of Kalu and Chinyere (2019) and Moorefield-Lang (2017) that some universities or schools already had makerspaces.

Research question three sought for the opinions of librarians on the adoption of makerspacesin federal university libraries in Northern Nigeria.The result showed thatmajority (490(70%) of the respondents had positive opinion on the adoption of makerspace in university libraries. This finding corroborate the findings ofAhn and Noh (2018), Kalu and Chinyere (2019) and Moorefield-Lang (2015) thatmajority of respondents(librarians)had positive opinion on the adoption of makerspaces in academic libraries.

Conclusion

Based on the major findings, the study concluded that Research question one showed that majority of the respondents (librarians) in university libraries were aware of the makerspace and this can induce the establishment of the makerspaces in the university libraries. Research question two revealed that the entire respondents indicated none availability of the makerspace in the federal university libraries in Northern Nigeria and this can have negative effect on the adoption of the makerspaces in university libraries. Research question three revealed that majority of the respondents had positive opinion on the adoption of makerspace in university libraries and this can also foster the development of makerspaces in the university libraries in Northern Nigeria which would serve as collaborative learning environments where students can come to share materials and learn new skills, ideas and work together on projects.

Recommendations

1. Management of university libraries should as a matter of fact create more awareness on the existence of makerspace as an emerging trend of learning space by enlightening and sensitizing the staff and community on the significance of makerspace in libraries.
2. Management of university libraries should strategies ways of using available spaces or create space by decongesting already existed spaces in the libraries to give way for creation of makerspaces to collaborate with other already existing learning spaces and operations such as work stations and workrooms for effective and productive learning.
3. Management of universitieshould encourage and support libraries for the adoption of makerspaces, as university libraries are established to strengthen the teaching, learning and community services which are the main objectives and missions of universities. In the same vein, the main aim of makerspace is to conjure and facilitate creative and practical experience of teaching and learning for library clienteles and the entire university communities.

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