Making a makerspace case for academic libraries in Nigeria

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Abstract:

**Purpose:** The paper gives a highlight on the concept of makerspace and its perceived benefits in academic libraries in Nigeria.

**Design/methodology/approach:** The searches encompass current journal articles, books, newspapers, magazines, personal experiences on the concept of makerspace, 3D-printing and technologies in libraries. Practical examples of libraries that already have makerspaces in operation were sourced.

**Findings:** Findings of this study create awareness of benefits, challenges and strategies for developing and managing makerspaces in Nigerian academic libraries, using Zenith Library as a hypothetical sample.

**Research limitations/implications:** Only the proposal guide has been drafted. There is need for more investigations on the awareness of, and plan to adopt makerspace technologies in Nigerian academic libraries.

**Practical implications:** Librarians need to appreciate the makerspace technologies and forge ahead in establishing makerspace in strategic areas of their libraries which should serve as a meeting point for all users in the university community, and for the sharing of innovative ideas.

**Social implications:** There is need for a paradigm shift in Nigerian university libraries, hence the shift in librarians’ thinking and approach to find their place in the new maker movement.

**Originality/value:** The originality of the paper lies in its justification for establishing makerspace in Nigerian academic libraries alongside the drafted proposal which has been designed to serve as a guide to libraries in Nigeria as no makerspace has been documented to be existing in any Nigerian library.

**Paper type:** Viewpoint

**Keywords:** makerspace, 3D-Printing, academic libraries, librarians, library marketing, library users, CETVETAR, University of Nigeria Nsukka.

Introduction

Technology has affected every sphere of life whereby people are moving from the paradigm of buying everything they need to making those things themselves. Libraries have keyed into most of these developments by involving in every emergent technology as noted by (Massis, 2014), that librarians are always on the cutting edge of the latest, newest, most high-tech service delivery models, and that is why the topic of “makerspace in libraries” seems very much top of mind. Makerspaces are rapidly growing in popularity as a unique way for libraries of all types to serve their users (Robinson, 2015). Although a nascent technology, the place of makerspace in libraries cannot be overemphasized; it draws users to the library and promotes collaboration among learners. The advent of makerspace technology promises to pave way for unlimited proliferation of knowledge and new ideas among scholars. The tide of this technology is gradually spreading globally and libraries are getting involved in this trend by advocating makerspace in libraries. As reported by Colegrove (2013), a number of libraries across the country have been actively expanding makerspace within the physical library and exploring its impact. Balas (2012) and Britton (2012), cited in Pryor (2014) remarked that makerspaces in libraries are definitely a trending topic in library discussion and literature, but much of the
attention in this area has focused on public libraries. In the same vein, Boyle, et al (2014) added that ‘the establishment of creative spaces (any place where the community can come together for informal and shared social learning) in public libraries has been an emerging trend worldwide in recent years’. One of the latest to latch onto the trend is the Ela Area Public Library in Lake Zurich, which held the grand opening Sunday for its new Forge makerspace lab (Ela Area Public Library, 2015). Bagley (2012) attested that ‘most of these early makerspaces are in public libraries’. This is also evident in the web-based survey conducted by Burke (2013) whereby 51% of respondents were in public libraries, 36% in academic libraries, and 9% were in school libraries. Nevertheless, it has become a recent development in academic libraries as well (Turner, et al., 2013). Libraries provide resources for not only consuming information, but also for generating new information and research (Pryor, 2014). Creation tools are traditionally provided in departmental labs and faculties but with the invention of makerspaces, libraries tend to support learning by adopting the trend of creating an enabling environment for critical thinking and experimentation.

Russell and Tierney (2008) advocate the need for information professionals to accept, support and nourish change and innovation in libraries. Turner, et al., (2013) added that ‘one of the changes occurring in academic libraries is the use of space to support both the library’s activities and the mandate of its parent body, sometimes in competition with other stakeholders in the academy’. This in turn, creates the opportunity for libraries to market their products and services due to the increased number of visitors to the library. Makerspace is just a space created in the library, by the library management to enable researchers share ideas and collaborate. A makerspace is usually equipped with essential tools that serve as raw materials for creation of product and it serves as a medium for creativity and innovation in the university and also according to Burke (2015), ‘a mechanism for encouraging students to experiment and learn beyond the classroom and outside of the normal structure of their assignments’. Academic libraries serve the staff and students of tertiary institutions by promoting teaching, learning and research and primarily gear toward achieving the aim of the parent institution. Housing materials such as 3D printers, 3D scanners, and other technologies within public institutions provides the community with equal opportunities for access (Anstice 2012). These are some of the technologies that are obtainable in a makerspace.

Beyond this, the library could move a step ahead in providing equal access to technology (Groenendyk, reported by Anstice, 2013) by introducing makerspace technologies which would pave way for creativity, self-discovery, collaboration and further help in marketing the library. Okon and Umoh (2014) reported that’ marketing of information and library services in Nigerian University Libraries has been at very low ebb.’ A study carried out by Ukwoma (2014) revealed that the major reasons for library marketing include: to showcase the resources available in the library, for librarians to maintain their relevance; to promote the image of the library; to help in the survival of the library; to create awareness among the university community; and to ensure the visibility of the library. Most literature on library marketing in Nigeria focus on strategies for effective library as: good communication skills, leaflets, library web page, face to face interaction with the user community, networking among professional colleagues, E-mail, bulletin boards, seminars and workshops, newsletters, publicity through advertisements and announcements, and through website (Ukwoma, 2004; Ronke, 2013). However, it has been remarked that no relevant literature suggests makerspace as a marketing tool in academic libraries in Nigeria. This gap in knowledge is what the current paper is trying to fill. In Nigerian Universities, laboratories exist in various departments but ‘makerspace’ is not common within libraries in Nigeria. The paper therefore serves as a guide to proposing a Makerspace in academic libraries in Nigeria, using Zenith Library as a hypothetical sample.
Makerspace: Concept and Background

Space is one of the most valuable assets a library possesses (Chan and Spodick, 2014). The paradigm shift in information resources from print to electronic and services from manual to electronics, calls for critical examination of the concepts, principles and features of library as space and place (Ugwuanyi, et al.). In recent years, university libraries have taken a more strategic approach to space planning and use (Matthews and Walton, 2014). One key concept according to Benneth, et al. (2005), is that ‘the library as a place must be self-organizing—that is, sufficiently flexible to meet changing space needs. The design of a library building should consider the efficiency of space and place (Ugwuanyi, et al.). To accomplish this, library planners must be more entrepreneurial in outlook, periodically evaluating the effective use of space and assessing new placements of services and configurations of learning spaces in response to changes in user demand’. Childs et al. (2013) found that in the 1970s, ‘lack of space for growing book and journal collections was a common concern, with little attention paid to how users might use its space in future’. Meanwhile, in an earlier study conducted by Childs (2011), ‘moving into the 1980s, there was recognition of the way technology may affect libraries, but with little focus on space and learning and research’. Association of College and Research Libraries (2010) noted that ‘in recent years, university libraries have taken a more strategic approach to space planning and use’.

As posted by The Library Incubator (2016) in ‘Library Planning Research, Space Planning’, ‘The library can show a better return on investment for digital knowledge resources by offering different types of learning spaces’. Learning space fosters sharing of ideas, in order to find solution to pressing issues or finding answers to questions thrown up in a group discussion. Learning environment in libraries have gone beyond solitary engagement to collaborative engagement. Academic libraries are essential to the core mission of colleges and universities across the nation (Soria, Fransen and Nackerud, 2013), and are for sharing ideas, making connections, contents, strides and a future (Gibrich, 2015).

The language of library space is such that the Library Incubator Project (2016) found during their library studies, that ‘all libraries need environments that allow for social, group and individual study. The library plan should include: (a) active space – information commons, learning commons, group collaboration, etc. (b) quiet space – contemplative space for study’. A space for study should enhance sharing of ideas for teaching, learning and research.

Makerspace is an enabling environment that enhances this sharing of ideas among individuals. It is a technology-enabled space for making things or environment where individuals come together to share knowledge and ideas. Makerspace is a nascent technology in libraries which is geared towards facilitating group learning. Anderson, (2012), cited in Burke (2015), reported that ‘the rise of makerspaces as a concept began around 2005 with the beginning of Make: magazine and its promotion of creative projects and methods for making’. The findings of the study carried out by Moorefield-Lang (2015) revealed that ‘the implementation of a maker learning space is still new to many libraries’.

Users in libraries are not used to a kind of space for working on tools together; rather they could read together and exchange ideas. The advent of makerspace has enabled individuals to incubate ideas and share it with others. Makerspace is a conducive environment where people are able to design products from zero to existence – a place designed to ‘democratize the act of making something from scratch’ (Cavalcanti, 2013) The Library as Incubator Project (2013) defined makerspace as ‘collaborative learning environments where people come together to share materials and learn new skills.’ This terminology was described by Turner, Welch and Reynolds (2013) as a very recent occurrence which is only beginning to appear in the literature.
but provides further evidence of the evolutionary nature of library space in terms of both usage and the language employed to define it. The Library Director of Miami University Middletown (John Burke) termed makerspaces as ‘a growing service area for many libraries in school, public, and academic settings’. Makerspaces are not defined by a specific set of materials or spaces, but rather a mindset of community partnerships, collaboration, and creation (The Library as Incubator Project, 2013).

So far the emphasis on makerspaces has been on creating, usually with some kind of technology (Abram, 2013). This has led Bagley (2014) to define Makerspace as a space designed to allow users to create, build and learn new projects and technologies. Makerspaces tend to engage users and build their level of literacies across multiple domains and the library serves as a centre for such activities as buttressed by Colegrove (2013) who stated that ‘one might even suspect that to some degree, libraries have long been makerspaces’. Libraries are gathering, meeting, and collaborating in spaces within the context of shared community and shared learning resources, which aligns well with library collection, staff, and space strengths and competencies … and with the makerspace concept, it is perfectly aligned with the library’s role in neighborhood and educational settings (Abram, 2013).

Why Makerspace?

Opportunities are needed by people to create, hack, and remake their world for the better (Britton, 2012) for which purpose, makerspace is a well suited platform, as it has been identified to give people the ability to create local solutions to local problems (Gershenfeld, 2005). According to Abram (2013), makerspaces are designed to meet the following needs:

- Provide access to a wide variety of tools and technology;
- Facilitate group interaction, knowledge, and resource sharing;
- Supply access to physical space for individual project development;
- Provide an open environment for expression of creativity and innovation;
- Access to equipment for prototyping project ideas for companies.

Boyle, et al (2014) further summarized that:

There are many clear benefits to both libraries and their communities from having a creative space. These include empowering your community, fostering community collaboration and co-creation, growing a larger, more-engaged user base, enabling inter-generational learning and social connectedness, facilitating trans-literacy, developing a culture of lifelong learning and adding socio-economic advantage to communities. Creative spaces also provide an opportunity for libraries to future-proof themselves and adapt to meet the changing nature of society (p.5).

Technologies in a Library Makerspace

Digital technologies such as video and image editing, computer programming, and animation are very common among library makerspaces (Burke, 2015). This is evident in the research carried out by Burke (2014) where lists of technologies in academic library makerspace were identified in a table (See figure 1):
The tools which could be found in a makerspace are: library space, 3D printer, 3D Scanner, software, computer(s), furniture, soldering iron, soldering benches, scissors, sewing machines, markers, cardboard papers, etc.

### 3D Printers

3D printers are printers primarily designed to print 3-dimensional objects. These objects are first designed with the aid of appropriate software before they are then printed. Piennar and Walt (2015) emphasized that ‘the key technology in a makerspace is 3D Printing’. 3D printing involves fabrication of 3D models. Additive manufacturing is a broader term for 3D printing. This involves the extrusion of thin layers of plastic (Gonzalez and Bennette, 2014). They can make prototypes and are even being tested for making circuit boards and human body replacement parts (Abram, 2013). 3D printer uses design software such as the ones reportedly installed at the University of Alabama - SolidWorks, AutoCAD, Google Sketchup Pro, and BFB Axon 2.1 (Scalfani and Sahib, 2013) and open-source hardware like Arduino Kits (Bagley. 2014). The use of 3D printers fosters the creation and altering of model. Proposing a model for managing 3D printing services in academic libraries, Scalfani and Sahib (2013) concluded that ‘the future outlooks for managing 3D printing services in university libraries appear very positive.’ Writing on ‘implementing a 3D service in an academic library, Pryor (2014) highlighted:

Three dimensional (3D) printing is a technology by which a machine builds a physical object from a digital model…. the most common 3D printing technique is “fused deposition modeling,” wherein the digital model is sliced into cross-sections by software, a raw material (usually plastic) is heated to a near-liquid state, extruded in a thin bead, and the cross-sections are deposited in layers by a computer-controlled nozzle. As these layers build upon one another, the melted material fuses to the previous layer and hardens, and a physical object resembling the digital model takes shape (p.1).

![Figure 1: Makerspace technologies. Adapted with official permission from Burke (2015).](image-url)
Figure 2 showcases the 3D technologies in University of Pretoria library Makerspace:

![3D technologies in University of Pretoria library Makerspace](image)

Figure 3: 3D Printer & Scanner, 3D Objects at University of Pretoria Makerspace. Source: Photo taken by the author, during a visit to University of Pretoria Makerspace on March 5, 2015 in connection with Carnegie Continuing Professional Development programme.

Makerspace in Libraries
Valdosta State University: Burke (2015) reported that Staff at the Odom Library created a makerspace by repurposing an unused room to give students a place to work on digital media projects. The makerspace was equipped by Library staff members who repurposed surplus equipment from the campus’ IT department, surplus furniture from elsewhere in the university, and by gaining internal grants to buy 3D printers. Library staff members offer regular workshops to teach students how to use the technologies or complete their projects independently.

Southern New Hampshire University (SNHU): The mission of the Shapiro Library Innovation Lab & Makerspace includes helping users become innovators, who then become makers (see figure 3).

![Shapiro Library Makerspace Model](image)

Figure 3: Shapiro Library Makerspace Model. Source: (http://libguides.snhu.edu/makerspace)

University of Pretoria: South Africa has recently joined the hype of makerspace in libraries as the University of Pretoria recently democratized making things by opening a makerspace in the library. The official opening of the library makerspace took place on 30th March, 2015. As
reported on the University of Pretoria News page on April 13 2015, The Department of Library Services at the University of Pretoria (UP) became the first library in South Africa to open a Library makerspace (http://www.up.ac.za/en/news/post_2062883-south-africas-first-library-makerspace-opens-at-the-university-of-pretoria-). The Library makerspace (figure 4) is a physical workspace in the Merensky II Library and a kind of laboratory that permits people who have great ideas to get together with people that possess the technical ability to materialize these ideas.


**University of Nigeria, Nsukka:** The aim of the University of Nigeria Nsukka is ‘to restore the dignity of man’, and the university library, being the heartbeat of the university is well positioned in achieving this by ensuring equal access to information. The Library was formerly situated in an old building which is presently housing the Exams and Records, Careers and the Climate Change departments. The holdings of the library were moved to the permanent site/New building which was officially opened and commissioned by the Honourable Minister of Education, Dr. Sam Egwu on 5th June, 2009. This is formally referred to as Nnamdi Azikiwe Library Main building.

Although no makerspace exists in University of Nigeria Nsukka, but there is a mobile lab which the author has identified as a ‘mobile makerspace’. This mobile lab is being managed by the Centre for Technical Vocational Education, Training and Research (CETVETAR). CETVETAR is a Senate-approved centre comprising two Departments namely, Vocational Teacher Education and Fine & Applied Arts, which were established in 1963 and 1961 respectively. CETVETAR is a World Bank assisted Centre of Excellence in Technical and Vocational Education and Training (TVET) and also a UNESCO – UNEVOC Centre in Nigeria (http://www.unn.edu.ng/centres/centre-technical-vocational-education-training-and-research).

University of Nigeria, Nsukka established the Centre for Technical Vocational Education, Training and Research Mobile College in June, 2015. In a document circulated to every staff of the University via e-mail, Professor E. O. Ede - Director of CETVETAR UNN wrote:

The CETVETAR UNN mobile college is a school on a wheel designed to partner with schools/colleges to provide practical skills in prevocational and vocational subjects at the junior and senior secondary schools as well as Vocational and Technical Colleges using mobile workshops/laboratories.
The prevocational subjects are: basic technology, computer studies, home economics, business studies, agriculture and fine arts. The vocational subjects at the senior secondary, vocational and technical schools/colleges are: woodwork, metal work, welding and fabrication, electrical/electronics, building construction, carpentry and joinery, automobile parts merchandising, machine woodwork, clothing and textile, upholstery, cosmetology, furniture making, painting and decoration, block-laying, brick-laying and concrete works, tie and dye craft, catering craft, data processing.

With this in place as a ‘mobile makerspace’, the university has practically commenced the makerspace movement although the library is not a part of this project which is also part of what informs the proposal.

Figure 5 is a photograph of some of the mobile labs which are currently parked at the Vocational Technical Education Department, University of Nigeria, Nsukka.

![Fig. 5: CETVETAR UNN Mobile Labs](picture taken by author with permission)

**Justification for Libraries as Places for makerspaces in Universities/academic institutions**

*The Library is a central place for learning*

The library is a central place where learners come together to learn new things – find out about new books and technologies and get latest information. Many students visit the library for research which is a great reason why makerspace should be established in the library. If makerspace is established in Science Education department for instance, not all students may find it easy to visit the department depending on the location, but when moved to the library, everyone would find it convenient to visit the makerspace because most users visit the library. In a study conducted by Slatter and Howard (2013), participant 2 remarked that ‘in providing materials, technologies, and spaces, makerspaces offer new learning opportunities, increase community engagement, and enable equitable access appealing to a variety of users, all of which contribute to future proofing the organization’.

*The Library is a center for innovation*

The library should serve as innovative spaces (Chan and Spodick, 2014) with the makerspace move, situating the library as a center for innovation where users are provided with a conducive and sophisticated environment for learning and collaboration. Burke (2013) reported that the library makerspace at the College of San MateoSan Mateo began as an attempt to serve students in a new way. Becoming more aware of users’ needs is a great way of improving academic library services. Users’ needs may change imperceptibly over time and libraries must constantly take such changes into account (Harbo and Hansen, 2012). American Library Association San Francisco annual conference and exhibition was held June 25-30, 2015 with the
theme as ‘public library as a center for innovation’. The conference was organized in attempt to redefine libraries as centers for innovation where spaces are created for users to support learning in digital literacy, visual literacy, cultural literacy, and spark innovation on every level.

The library is a place for knowledge creation

The library’s role in knowledge creation and STEM (science, technology, engineering, and math) education further endorses the library as a place for makerspace. The library supports teaching, learning and research and also creates an enabling environment for innovations and inventions. Every other department in a university may have their laboratories but a makerspace brings people from all fields together, and the library being the heartbeat of the University can only serve as a central place for all. The ‘it’s just a trend’ argument should not be used to hold off on implementing a makerspace (Bagley, 2014), otherwise it will hold no water to the University Administration when proposing a makerspace in an academic institution. In a web survey conducted by Burke (2013), Librarians reported that training sessions, workshops, or classes in their makerspaces were taught by library staff (49%), volunteers (27%), paid instructors from beyond the library (13%), or “other” (12%), which includes IT staff, maker group members, “Student Geek Force,” and “center for teaching and learning. This establishes that librarians are in the forefront of makerspace technologies in academic institutions.

Marketing of library services

Makerspaces are just the beginning of the innovative projects libraries can undertake to attract community members (Pugliese, 2015). When a makerspace is established in a university library, it will boost the library’s image from read to create/passive to active (Piennar and Walt, 2015). Makerspace will promote conversation, collaboration and creation and by providing access to a variety of resources, the users would be left with no option than to always visit the library. Often times, the University administration would like to have the library report for the year and with makerspace in place, it may be shocking to find out the increased number of library users per annum due to the side attraction of makerspace.

Equitable access to new technologies

Users who initially had not been exposed to new technologies such as 3D-printers and scanners may have the opportunity of getting to explore these new technologies as they visit the library makerspace. Some technologies would have been off-limits to users but with the makerspace in place, users can have equitable access to them (Britton, 2012). The technologies also contribute to providing a new space for users to participate in new learning opportunities (slatter and Howard, 2013).

Implication for librarians and students

With the advent of makerspace in libraries, the following are expected:

a. Organization of sensitization and literacy programmes for users on the use of the makerspace technologies. The University of Alabama has the librarian as responsible for management policies, material procurement, workshop training, and instruction materials, while the full time staff member facilitates scheduling, and performs the daily maintenance of the 3D printer (Scalfani and Sahib, 2013).
b. A designated webpage or Facebook page for the makerspace. Latest technologies at the makerspace could be announced on this page. Creating this page and also creating a link to the main library page will pull traffic to the events of the main library.

c. New Portfolio for Librarians: The emergence of Makerspace will create new designations for librarians such as *makerspace Manager, makerspace Librarian*.

d. Continuing Professional Development: there will be need for librarians to get involved in trainings on technology trends. Current materials on emerging technologies and makerspace. Videos and webinars on makerspace experience of other libraries, and 3D printing technologies may be downloaded.

e. Students enrolled in technology-oriented subjects like Engineering, Computer Science, Vocational and Technical Education, Architecture, Home Economics, and researchers in many disciplines like Arts, will become the beneficiaries of the makerspace environment. The 3D printer will help such students in creating 3D visualizations of their products and ideas. In evaluating the 3D user participation and learning at the University of Alabama, the users were reported to have come from various departments such as Art, Engineering, Chemistry, Physics, Biology and English (Scalfani and Sahib, 2013). Researchers can develop custom-designed tools to support their unique equipment needs, bypassing the challenges and often significant costs of purchasing specialized items (Zhang et al., 2013). Aside using 3D printers, students in Arts and Vocational Education are empowered to think and design things using other equipment like measuring tapes, sewing machines, software for special designs.

**Library makerspace: A Proposal Guide**

Based on the experience gathered by the author during the Carnegie Continuing Professional Development Programme held 28th February-28th March 2015 vis-à-vis information assembled during research, the following could serve as a guide to proposing a makerspace for academic libraries in Nigeria, using Zenith Library, University of West Africa as a hypothetical sample.

**MAKERSPACE PROPOSAL SAMPLE FOR ACADEMIC LIBRARIES**

**Name of Library:** Zenith Library, University of West Africa

**Proposed Makerspace:** Zenith Library Makerspace

**Definition:** Makerspace is an environment for collaboration among individuals (students and researchers). It is a space for sharing of knowledge and ideas among colleagues.

**Objectives:**

a. To create a platform for the university community to be creative, innovative, share new knowledge, learn and share new ideas.

b. To create an enabling environment for researchers to pop up new ideas

c. To allow people with common interests to share ideas.
d. To allow the university community to learn from the experts in a given field.

e. To create room for the university community to be innovative

f. To market the library services

g. To foster the collaborative trust that allows the concurrent and interdisciplinary development of ideas

h. To house the fantastic technology to aid in the development and prototyping of ideas.

Mission Statement: Helping users create new knowledge

Proposed URL: www.zenithlibmakerspace.edu

Proposed Location: The makerspace will be located off the reading area. There will be a partitioning of the open space which would have doors, windows, the makerspace equipments (see floor plan). Apart from the advantage of space, the location for the makerspace will ensure better security of the equipments due to the presence of security personnel and porters around the area. Also, the location is a central, open access area within the library and therefore, is strategically located, especially with its nearness to the OPAC. This will ensure high user participation and interest. An evaluation of the UA Libraries 3D Studio management policies revealed that positioning the 3D Studio in a visible open access area and allowing authorized 3D users to experiment in the 3D Printing Studio independently greatly contributed to the success of the program (Scalfani and Sahib, 2013).

Target audience: Registered Library users (esp. Students and lecturers)

Technologies/tools/Activities: a. Space in the library
b. 3D Printer
c. 3D Scanner
d. Digitization technology
e. Software: autocad, autodesk, etc.
f. Hardware: computer, etc.
g. Furniture: tables, chairs, white board, duster, etc.
h. Consumable materials (such as super glue, electrical tape, sandpaper, modeling paint, and acetone).
i. Electricity
j. Internet: access to social media for collaboration opportunities and public display of brain child/product
k. Soldering iron
l. Cutting machines, eg. Knife
m. Camera
n. Big screens

o. Sewing machines, needles, scissors
p. Audio equipments: microphones, speakers, etc.
**Policy Development:**

a. The place will be open once the library opens and closes 3pm.
b. The staff to man the space will comprise a core librarian and two or more technical staff.
c. The users of the space will be students and teaching staff who have registered with the library
d. There will be training sessions once every week on use of the equipments/ tools/ technologies available in the space.
e. There will be no snapping of pictures without the permission of staff on duty.
f. Students and staff will not be charged for use of the space
g. Students and staff will provide their own raw materials for production.
h. There will be no eating nor drinking in the space
i. The space will not be used as a regular reading room; it will be strictly for innovation and collaboration.
j. Users of the makerspace will register.

**Budget Plan:**

- Budget for building - (the library will provide the space).
- Budget for tools (3D Printer, 3D scanner, etc)
- Staff Budget:
  - Staff Employment/Deployment
- Funding Source:
  - Library Annual Vote/Budget
  - Donations
  - Local investors

**Floor Plan:**

The 2D and 3D views of the proposed makerspace floor plan are represented in figures 7 and 8 respectively. [Designed by Helen Okpala]
Perceived challenges of implementing a makerspace project in university libraries.

The introduction of any form of technology in developing countries’ libraries has always been faced with challenges (Nok, 2006) most of which would in turn; affect the makerspace technology in libraries. Some of these include:

- **The challenge of training the users:** It may take time before the users master the terminologies and intricacies of the makerspace. 3D technology in particular, is not an easy one to master; it may take longer time than expected for the users to master. Learning the ins and outs of 3D printers and other equipment takes a lot of time and patience (Harris and Cooper, 2015). With this in mind, the makerspace manager ought to learn to be patient with the users and allow for more learning time.

- **Security challenges:** Safeguarding the equipments in the makerspace is very crucial and it becomes paramount that more security personnel are deployed to the library for this purpose to avoid stealing of objects.

- **Funding Issues:** Poor funding is a major challenge to libraries in Nigeria (Nok, 2006).

- **Lack of sufficient space in the library building:** Space is one of the most valuable assets a library possesses (Chan and Spodick, 2014). The university library physical space has an important role in learning, teaching and research, despite the increase in digital information provision (Matthews and Walton, 2014).

- **Erratic power supply:** Nigeria is yet to be named among the African countries that have celebrated one whole year of uninterrupted power supply as regular power generation remains a problem in Nigeria. Frequent power outages constitute a serious bottleneck to automation. The cost of running generating plants is prohibitive (Nok, 2006). Quite a lot of money is being invested in Higher institutions to find alternative power supply. In a study conducted by Krubu and Osawaru (2011), it was ascertained that poor funding and erratic power supply are the major factors acting as a drawback or an impediment to the application of ICT in Nigerian University Libraries.
• **Technophobia:** It is common knowledge that older librarians are the ones that suffer more from technophobia. The younger librarians are becoming more technology savvy than ever. But the underlying factor is that the older librarians form a greater population in most university libraries in Nigeria and with their fear for modern technologies in libraries, this may affect the establishment of makerspace in libraries.

• **High cost and maintenance of equipment, Internet bandwidth, hardware and software:** The librarian has always worked with less and done more, it often comes down to a simple lack of resources that prevents the librarian and the library from innovating at an even higher level (Massis, 2014). When the required resources are seemingly off-limits for libraries, makerspace can seem an expensive indulgence (Slatter and Howard, 2013).

### Conclusion and Recommendation

Students in Nigerian Universities usually organize discussion classes prior to their examination period. Often times, spaces in libraries are filled up such that these students cannot find space to meet for discussion. The idea of situating makerspace in the library goes beyond drawing users to the library to fostering creativity and invention. Makerspace in libraries and its rewards cannot be overemphasized. For Southern New Hampshire University’s Shapiro Library, the experience of developing a makerspace and offering these services has been highly rewarding – several students, faculty members, and staffers are learning new things, working with their peers, considering new ideas, exploring, tinkering, inventing, and making (Harris and Cooper, 2015).

In proposing a makerspace in libraries for an academic institution, there is the need to make references to existing makerspaces in other libraries and their success stories and then an opportunity to visit libraries where makerspaces exist should be suggested. This calls for training and workshop opportunities for librarians on makerspace. The established benefits will lead the way to writing a concise proposal to the University management on establishing a makerspace in the University library which will likely yield a positive result. Based on the survey conducted by Burke (2013) as earlier cited, the library management is expected to equip their staff with makerspace skills by sending them out for training on makerspace technologies which may be achieved by utilizing the exchange programme opportunity, thereby availing some librarians opportunity to travel abroad to learn about makerspace. Librarians can also enroll in online courses on makerspace, for instance the *Maker Workshop* organized by School Library Journal. Instructors could also be hired from beyond the library, who can help in familiarizing users with the technologies at the makerspace.

There is need for makerspace in the Nigerian academic library for the fact that it will help build a community of collaborators, introduce new technologies, as well as boost the library’s image. The library however, needs to seek the support of the university administration for this project to come to fruition. The University librarian being a Principal Officer of the University (especially in Nigeria), should have a reflective discourse with key stakeholders and governing bodies (Cottrell, 2014) of the University to bring this to limelight. The recent creation of the faculty of Vocational Teacher Education in University of Nigeria, Nsukka paves a way for creative works by students. Besides, one of the targets of CUDIMAC (Curriculum Development and Instructional Materials), University of Nigeria Nsukka, is ‘to establish a micro-teaching laboratory with state-of-the-art multi-media educational equipment for the training of student-teachers and re-training of Nigerian teachers at all levels of education ([http://www.unn.edu.ng/academics/centres/curriculum-development-and-instructional-materials/](http://www.unn.edu.ng/academics/centres/curriculum-development-and-instructional-materials/)).’ With the mobile makerspace in place, as proposed in this paper, this target can easily be achieved.
Introduction of makerspace in Nigerian academic libraries is very crucial and it would not incur much cost to establish one in libraries that have enough space. The top floor of Nnamdi Azikiwe library has so much space that half of the topmost floor called ICT Pack (Ezeani, 2015) has been officially allotted for Computer Based Test (CBT) for JAMB (Joint Admissions and Matriculation Board) and UNN PUME (Post University Matriculation Examinations). The space is also generally used for ICT workshops and trainings. Staff from the security department are usually deployed to the library and placed on shift duty which automatically makes the library secured 24/7.

There are a good number of technology savvy librarians qualified to indulge in the training of users on basic ICT skills. The digital librarian, MTN library Connect librarian, Digitization librarian, Special ICT Project Unit librarian, Programmers, and others, are well equipped to train users on basic ICT skills. So many of the librarians have drilled in trainings and workshops, home and abroad, on technologies in libraries such as mobile apps in libraries, Web2.0 in libraries, Database search, Cloud Computing, Website Architecture, etc. The only training the staff may need in this case is that of 3D-printing and all the technologies obtainable in a makerspace.

References


The Library Incubator (2016), Library Space Planning, the third place, available at: http://www.acohen.com/blog/?tag=library-space-planning


