

Creating Makerspaces in Nigerian Libraries: Issues and Challenges

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Abstract - The existence of makerspaces in libraries ensures that libraries are able to build a society where citizens are able to think critically, solve problems and collaborate in order to succeed in STEM and other areas of life. Makerspaces provide creative time and space for people of all ages to build prototypes, explore questions, fail and retry, bounce ideas off one another and build something together. This paper examined makerspaces in Nigerian libraries, low-tech and high-tech makerspaces, as well as makerspaces and libraries. The paper 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 paper concluded 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

Keywords: Makerspaces, Creative Spaces, Nigerian Libraries, Challenges, Library Innovation, Hacker Spaces

I. INTRODUCTION

Makerspaces, also known as hackerspaces, hack spaces, Tech shop or fablabs are spaces where individuals or groups converge to get innovative with Do-it-yourself (DIY) projects, share ideas and invent new ones. Burke (2014) defined makerspace as:

An area in a library where users can use tools and equipment to design, build, and create all sorts of different things. It may be a dedicated room or a multipurpose space in which a collection of raw materials and resources can be utilized as desired. Projects range from prototyping product designs with 3D printers, to programming robots, to creating art out of recycled items (p.4).

Pisarski (2014) noted that makerspaces consist of a community of makers that come together to create by sharing tools, skills, and knowledge—“creating a place to learn a new skill, to become a creator, to connect with a community and build friendships, or to gain access to specialized equipment” (p.15). Makerspaces therefore entails collaborative work space inside a school, library or separate public/private facility for making, learning, exploring and sharing knowledge that uses high tech or no tech tools (Makerspaces.com, 2019).

These spaces are open to kids, adults, and entrepreneurs and have a variety of maker equipment including 3D printers, laser cutters, soldering irons and even sewing machines.

Makerspaces create room for high level creativity and productivity among users.

The idea behind makerspaces in library is to encourage users to get creative and engage in DIY projects. It must however be noted that makerspaces does not only include machines and other technological gadgets. It also include a no technology creative space. In other words, makerspace could either be high tech or low tech. 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 math (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,

II. LOW-TECH AND HIGH-TECH MAKERSPACES

Makerspaces are as likely to be low tech as they are to be high tech. Makerspaces are said to be low-tech when it does not involve the use of electronic technology for creativity. Low-tech makerspaces will have equipments like markers, paint, fabric, LEGO blocks, clay, power tools, and even (non-electronic) hand tools. In the Nigerian Society, low tech makerspaces in libraries could provide a platform for library users to learn different art and craft such as textile making, Nigerian pottery, sculpture and wood carving, tie and dye textile, Igbo-ukwu, painting and lots more. Rosheim (2018) identified low-tech makerspace materials as craft supplies, cardboard, plastic materials, paper, styrofoam, paint, collage materials, rainbow loom, knitting and crochet supplies, legos, tinkertoys, k'nex, attribute blocks, box rivets (makedo and/or mr. mcgroovy) and plastimake. Other materials include sewing machines, old electronics for tinkering, electric keyboard, tinkering tools, how-to books, video production materials-green screen and lighting.

Conversely, high tech makerspaces involves the use of latest and cutting edge technological gadget (such as 3D printers, fabricated software, robotics, and computer software and coding programs) for creativity and innovation. In Nigeria and other sub Saharan African countries, users can learn graphic designing, digital marketing, web design and development as well as networking. High-tech makerspace materials include 3D printers, littleBits, MaKey-MaKey,

Sphero Robotic Balls, Ollie, OSMO, ipads-loaded with production apps, Robotics Materials-WeDo/Lego Mindstorm EV3, Motors, LED lights, Snap Circuits, Dash and Dot Robots, Cubelet Robots (Rosheim, 2018).

Nevertheless, whether low-tech or high tech, makerspace encourages productivity and share roots with a myriad of

concepts. It also contributes to the DIY (Do-It-Yourself) movement, constructivist philosophy, whole-brain thinking, and even the STEM initiative. That said, it is pertinent to state that low tech and high tech makerspaces differ in the way they are taught and they also offer different advantages. The advantage of low tech and high tech makerspaces according to Maharaj (2015) is presented in table I.

TABLE I ADVANTAGES OF LOW TECH AND HIGH TECH MAKER SPACES

“Low”-Tech	High-Tech
Small investment in supplies, overhead, and external technical expertise	Exposes students to cutting-edge technology
Open-ended—little guidance and instruction required	Latest technology, such as 3D printers, has dramatically dropped in price
Easy to implement	Has a deep focus on developing interest in STEM
Requires little supervision	Students can pick up highly specialized skills
Supply list includes (but not limited to): 1. Paper cutouts 2. Beads 3. Clay 4. Duct tape 5. Gears 6. o Paint	Supply list includes (but not limited to): 1. 3D printers 2. Laser cutters 3. Welding equipment 4. Milling machines 5. Lathes 6. Computers & software 7. <u>Digital Die-Cutting Tool</u>

III. MAKERSPACES AND LIBRARIES

Makerspace is unique and the projects that are worked on inside of them are also very diverse. Some of the things one can do in a makerspace include coding, 3d printing, laser cutting, soldering, electronics /arduino, robot building /robotics, learn circuits and electricity with paper circuits, sewing, wood working, take-a-part sessions and inventing. These programs are often time organized by schools and libraries.

In recent times, libraries organize makerspace programs and workshops for users in different age groups. Library makerspace programs and workshops are planned by library management or community groups to help users learn, create, use and share DIY knowledge. While there are general makerspace programs organized by groups outside the library, libraries (especially school and public libraries) organize makerspace programs for different age groups. Pisarski (2014) observed that school libraries for instance, organize makerspace activities such as sewing kits and knitting, cardboard creature challenge, tech take-apart robot challenge, and recycled book art gallery for children. This knowledge not only improves the critical thinking ability of the participants, but also helps them to be creative. Apart from creativity, libraries provide space for users to share and create resources, knowledge, and relationships. In other words, the community can share the tools, information, or techniques that underlie creation at the library. According to Abram (2013), libraries (with Makerspaces) are able to:

1. Provide access to a wide variety of tools and technology;

2. Facilitate group interaction, knowledge, and resource sharing;
3. Supply access to physical space for individual project development;
4. Provide an open environment for expression of creativity and innovation;
5. Access to equipment for prototyping project ideas for companies.

Furthermore, libraries have used makerspace projects to get users busy and productive. Lee, Lewis, Searle, Recker, Hansen, and Phillips (2017) reported that new Maker-oriented programs have been co-developed by libraries in the United States (US). Public libraries have organized Teen nights and used MaKey MaKey interface boards (makeymakey.com) to create new forms of computer input using conductive materials. Lee *et al.*, (2017) also noted that school libraries in the U.S have launched an afterschool activity with an emphasis on Making with paper circuitry and electronic textiles. From their narrative, youth had access to copper tape, conductive thread, coin cell batteries, various craft and found objects, and LEDs to make interactive paper and cloth objects. It is however evident that through Makerspaces, libraries can promotes inventions, creativity and ingenuity.

IV. MAKERSPACE SET-UP REQUIREMENTS FOR NIGERIAN LIBRARIES

Makerspaces provide platform for makers to be creative by learning how to do new things through hands-on, human interaction and experimental play. To be creative and inventive, a maker must work in a suitable environment where they can turn their ideas and imagination into ‘actual

stuff'. However, setting up a makerspace in libraries goes beyond finding the right space. It also entails getting the library users active and identifying leaders and mentors to take charge. The following are the requirements for setting up a makerspace in the library.

1. Makerspace policy and goals
2. The right space
3. Makerspace theme or program for the target audience
4. Funding for getting the right tools and materials.
5. Identify training and support expert/mentors for the program

V. STEPS FOR DEVELOPING MAKERSPACES IN NIGERIAN LIBRARIES

Before setting up a makerspace in libraries, some basic steps must be followed. Pisarski (2014) identified the following as the basic tips for developing a makerspace:

1. Plan sustainable and long lasting activities: Don't invest in expensive materials that patrons take home with them. Instead, invest in products and kits that can be reused in many ways.
2. Scaffold your activities: This will allow for participants to feel challenged and engaged, as well as limit the amount of direct instruction required during each session and provide more time for making.
3. Bigger isn't always better: Simple and inexpensive activities can encourage creativity and be just as fun as products that require expensive equipment, such as 3-D printers. Game creation can be done with a box filled with scrap materials like paper, cardboard, markers, buttons, fabrics, and plastics. Low-cost materials can be obtained through donation, dollar stores, thrift stores, or clearance merchandise.
4. Consider online resources such as Little Bits, Snap Circuits, Cameo, and Maker Shed, which will provide relatively low-cost, technology-based products. Topics range from electronic music, the science of circuitry, graphic design, and computer programming.

VI. BENEFITS OF LIBRARY MAKERSPACES TO LIBRARY USERS

There is no gainsaying that makerspace promotes creativity, innovativeness, knowledge creation and sharing among individuals. Library users benefit from makerspaces in a number of ways as it enable them to learn, create, use and share DIY knowledge. Library makerspaces are cheap, or sometimes free with no admission cost. According to the Institute of Museum and Library Services (2014), some of the benefits of library makerspaces to library users include:

1. It provides organized activities and safe places for teens to go after school.
2. It develops strong partnerships with community organizations to reach at-risk teens.

3. Through innovative programs such as learning labs and makerspaces, library makerspaces offer teens the opportunity to develop the 21st century skills.
4. It provides community service outlets for teens by engaging them in the development of young adult programs and teen advisory boards.
5. It helps teens explore and pursue their educational goals by offering information about higher education institutions as well as access to online applications and student financial aid forms.

Furthermore, with makerspaces, libraries could help achieve national development especially in the area of technology. Rosheim (2018) identified the benefits library users (students) derive from library makerspace as:

1. Allow participants to embrace failure as a means for heading toward success
2. Allow participants to collaborate and learn from one another
3. Create experts who participants will look to for guidance
4. Foster creative thinking
5. Create ways for participants to ask real questions to drive their exploration
6. Encourage participants to pursue existing passions or seek out new passions
7. Ignite excitement and a joy for learning
8. Promote multiple ways to solve problems
9. Allow participants to practice perseverance in day to day learning
10. Expose participants to materials they may have never used before: 3D printers, robotic balls, textile materials, circuits, littleBits, programming, and so much more!
11. Encourage participant reflection on the process of making
12. Create thinkers

VII. ISSUES AND CHALLENGES OF MAKERSPACES IN NIGERIAN LIBRARIES

The adoption of a new innovation is always welcome with numerous challenges. In Nigeria, the challenge of implementing a new idea is even greater when such idea involve the use of technological gadget. The introduction of makerspaces in Nigerian libraries has been faced with different challenges despite the numerous benefits derived from makerspaces in libraries. Aiyebilehin, Onyam and Akpom (2018) explained that some of the challenges facing makerspaces in Nigerian libraries are perennial problems affecting all ICT related projects in Nigerian libraries. These challenges ranges from negative perception of traditional librarians, poor funding of libraries, lack of librarians' willingness to adopt innovative strategies in library, to lack of trained personnel to handle the maker Spaces. In addition to poor level of awareness of the concept of maker Spaces among librarians, there is the issue of poor storage facilities and poor maintenance culture of library infrastructures.

Furthermore, while inadequate funding remain a default and global challenge faced by libraries in the deployment of new technologies, libraries in Nigeria encounter unique challenges in the development of makerspaces. These challenges include but not limited to:

A. Lack of Adequate Skilled Staff: One major challenge faced with libraries in Nigeria is the challenge of inadequate skilled staff. Many libraries in Nigeria (especially in public libraries) are managed by para-professionals and this affects the overall output of the library. There must be adequate skilled staff in the library if the library is to organize effective makerspace programs.

B. Space Issues: Finding the right space is key to having a successful makerspace program. However, adequate space is one thing that many libraries in Nigeria do not have. The issue of space has so far hindered many libraries from creating makerspaces programs and workshops. Even though makerspaces can be set up almost anywhere, librarians must find the suitable space for a particular makerspace program.

C. Lack of Interest by Library Staff / Staff Resistance to Change: Just like other technological innovation introduced to libraries, makerspaces have been faced with strong resistance by library staff. This resistance can be largely attributed to lack of interest by most of the library staff. This has so far affected the creation of makerspaces in different libraries in Nigeria.

D. Incessant Power Outage: One major problem facing different sectors in Nigeria is the issue of incessant power outage. This challenge has affected libraries in no small way. Many technological inventions in libraries have been put aside because of the epileptic nature of power supply. Makerspaces, just like every other library project is affected with the incessant power failure experience in Nigerian libraries.

E. Mentorship Issues: Makerspaces workshop require the right mentor for the right program. Getting the right mentor for the right makerspaces program always pose a challenge for libraries as not all libraries have staff who can mentor participants in workshops.

F. Low User Patronage of Library: Libraries in Nigeria, especially public libraries, are currently experiencing low user patronage. This is largely due to the non-attractiveness of most libraries and the advent of internet and internet sub-technologies. Many youths and teens no longer see the public library as a place where they can meet their information need. This problem has hindered makerspaces in many Nigerian libraries since effective makerspaces require the active participation of the library users.

G. Technophobia: The fear of advanced technology and complex devices is a continuous challenge to the adoption of new technological innovations in libraries. Many librarians are currently not ICT compliant and as such demonstrate high level of anxiety whenever a new technology is introduced in the library. Okpala (2016) observed that the issue of technophobia is common among the older librarians and they form a greater population in most libraries in Nigeria. This has so far hindered the creation of makerspaces in most libraries.

VIII. CONCLUSION

Libraries in Nigeria need to take its stand as the hub of knowledge creation and sharing. Through creative spaces in the library, users can develop and share DIY knowledge among colleagues. Also the existence of makerspaces in libraries will help in building a community of collaborators as well as introduce them to new technologies. In addition to building the critical thinking ability of citizens, makerspaces will also foster the development of their interpersonal, communication, teamwork, leadership and mentoring skills. It is therefore extremely important for library administrators to support this innovation.

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