Harnessing Children's Creativity through Makerspace for Connectivity and Learning in Nigeria's School Libraries: Role of Stakeholders

Olawale Oyewole[1], Magnus Osahon Igbinovia[2]
Department of Library, Archival and Information Studies, University of Ibadan, Nigeria[1 & 2]
oyewolebaba01@yahoo.com[1], infor.migbinovia@gmail.com[2]

Abstract

Purpose*: The purpose of the study is to examine the concept of makerspace in relation to harnessing children's creativity for connectivity and learning in Nigeria's school libraries, as well as investigate the role of stakeholders.*

Design/Methodology/Approach: *The study is a conceptual paper which employed a literature review approach to collect, synthesize and analysed information in mainly primary and secondary sources taking into cognisance the identified problem of the study and the specific research objectives.*

Findings: *The paper found out that though making is not a new concept, makerspace is relatively new as amplified by the Maker magazine in 2005. It also revealed that makerspace is the engine room for creativity either combinational, transformation or exploratory, and creativity is in turn, central to making. Also, the study showed that makerspace creates an atmosphere where a maker connect with his or her inner self by probing and tasking the mind; with others, by promoting cooperation, knowledge sharing, teamwork and collaborative learning; and with the society through innovation which is usually the outcome of creativity enhanced. Moreover, the study found out that stakeholders of makerspace in schools (school management, teachers and school librarians or media specialist) play crucial roles to include lobby, advocacy, organise/execute makerspaceproject, respectively.*

Practical Implication: *The study has implications for stakeholders in makerspace project in ensuring successful implementation in order to boost school children's creativity which has implications on their connectivity and learning abilities.*

Originality/Value: *The study fills an existing dearth in literature on how Nigeria school libraries can develop students' creativity through makerspace. It fosters a synergy between government, school administrators, teachers, librarians and related bodies like Nigerian Library Association (NLA), in setting up measures that encourages the execution of makerspace programmes in schools.*

Keywords*: Children, creativity, makerspace, school libraries, Nigeria*

Paper type*: Conceptual research.*

Introduction

The primary and secondary schools in Nigeria prepare children for the demands of the society through inculcation of knowledge, skills and virtues that could make excel later in life. A critical component in this preparation process is the school library, which provides the information resources as well as an environment suitable to mold these young minds positively in primary and secondary schools within the context of Nigeria. Over the years, the ideal school library's space apart from providing the opportunity for school children to read and study, also created an environment where they can interact, engage in crafts, share stories and play games.

The 21st century school library has transcended as civilization makes possible, catering for the overall development of the child. School libraries have transcended to essential learning resource centers that support students' academic achievement (Achterman, 2008; Trilling, 2010), develop in children 21st century skills (Kachel, 2011), gives equal access to the physical and intellectual resources and tools needed to learn in a stimulating and comfortable environment

(American Association of School Librarians, 2007) and contribute to students' learning in the areas of motivation, progression, independence and interaction, (Williams and Wavell (2001). Thus, school library is an integral part of every school system for developing the metal capacity of the school child.

School libraries have been a learning space for children to enhance their cognitive development through logical reasoning, quantitative and qualitative analysis, applied arts among others. However, the need for children to develop affective aspects; connecting with themselves, others and their society is a fundamental reason for makerspace which according to Honey and Kanter (2013) is essential in retooling school libraries. Makerspace according to Feinstein, DeCillis and Harris (2016) are places where people can design and invent among a commodity of makers. Their definition of makerspace suggests that it is a creative space for skill development which is the focus of 21st century educational system. This corroborates the assertion of Lonsdale (2003) that there is a paradigm shift in educational system from content-based education with emphasis on what students have been taught to an outcome-based education which focuses on what have learned in terms of skills and understandings.

While makerspace is simply a space for making (creating, inventing or producing), Feinstein, DeCillis and Harris (2016) note that creativity is central to the concept of making since it is experimental, hands-on and focus more on the supportive process than on an end result. As a result, participants (makers) engage in a circle of trying and failing which is a necessary component of risk-taking and innovation. This could instil in the participants the need for persistence in achieving success. Makerspaces are places where children's creativity is greatly harnessed as such Peppler, Maltese and Keune (n.d) referred to makerspace as creativity lab, children's creativity museum, among other names.

Hence, children's creativity can be enhanced through makerspace which in addition develops in them affective abilities by connecting them with themselves or "inner self", with other makers, mentors or trainers and the society. Moreover, in order to develop in children critical thinking, analytical thinking and experiential knowledge, their cognitive abilities need to be developed. It can thus be extrapolated that school libraries via makerspace harnesses children's creativity for connectivity and learning. However, in ensuring this, the rolesof relevant stakeholders are essential in the process

This study thus seeks to theoretically explain the makerspace movement; concept of creativity in children and makerspace; role of makerspace in facilitating connectivity and learning by children; and, role of stakeholders in enhancing children's creativity and learning through makerspace in school libraries.

Statement of the Problem

The creation of makerspace in the school library has the potential of transforming the mindset of the children into one that favours creativity. Despite this, it seems as if school libraries in Nigeria have not taken full advantage of makerspace. This is because it is not a common sight in most primary and secondary schools in Nigeria, especially those owned by the government to see makerspace in the school libraries. This could be attributed to insufficient knowledge of the role that makerspace plays in developing children's creativity and also what is expected of the relevant stakeholders in this regard. As a result, the need for a conceptual clarification on the role of stakeholders in harnessing children's creativity through makerspace for connectivity and learning in school libraries becomes imperative.

Research Objectives

The aim of this paper is to investigate how children's creativity can be harnessed through makerspace for connectivity and learning in Nigeria's school libraries, and the role of stakeholders in this regard. In a bid to achieve this, the specific objectives of the study are to:

1. examine the concept of makerspace movement;
2. examine the concept of creativity in children in relation to makerspace;
3. ascertain the role of makerspace in facilitating connectivity and learning by children; and,
4. ascertain the role of stakeholders in facilitating children's creativity, connectivity and learning through makerspace.

Methodology

The study is a conceptual paper which employed a literature review approach to collect, synthesize and analysed information in mainly primary and secondary sources taking into

cognisance the identified problem of the study and the specific research objectives. This approach is fit to explore available but scarce literature on makerspace and to juxtapose it with related concepts like creativity, connectivity and learning. The study therefore generates literature that fills a gap in the body of knowledge.

Literature Review

This section is a review of the available literature that provides information on the role of stakeholders in harnessing children's creativity through makerspace for connectivity and learning in school libraries. The review is done in line with the objectives of the study.

The Concept of Makerspace Movement

The idea of making things pre-existed and co-existed along civilization which simply involves the production of commodities which is of relevance to society. Thus the need and drive to make has long been in existence and this corroborates Stager (2014) who noted that certain aspects of makerspace movement such as hobbyists, arts and crafts groups, shop classes, practical education and science fairs have existed for ages.

However, the lunch of maker: magazine in 2005 and the subsequent publications of maker related project boosted the makerspace movement. Martinez and Stager (2013 p.27) noted that maker: magazine is the Gutenberg Bible of the burgeoning 'maker' community. The maker: magazine gave makerspace the voice required to spread, hence the makerspace movement. Dougherty (2005) noted that the make: magazine revealed how individuals could make technology work for them. Another spread for this movement was President Obama administration's commitment to creativity and innovation for the future generation in United States of America.

The President Obama administration initiated a campaign in 2009 tagged "Educate to Innovate" with the objective of enhancing innovation by making creativity a central aspect of learning. The makerspace movement was spurred by this campaign by the very speech "I want us all to think about new and creative ways to engage young people in science and engineering, whether it's science festivals, robotics competitions, fairs that encourage young people to create and build and invent—to be makers of things, not just consumers of things" (Sheridan et al, 2014, p. 506). To this end, the White House organized a Maker Faire in 2014 which was supported by numerous large companies for sustainability, (Bevan, Gutwill, Petrich & Wilkinson, 2014). This support propagated makerspace movement in U.S and all around the world.

According to Peppler and Bender (2013) in Feinstein, DeCillis and Harris (2016) on the concept of makerspace movement, the duo asserted that "the (maker) Movement is unified by a shared commitment to open exploration, intrinsic interest, and creative ideas. And it's spreading: Online Maker communities, physical makerspaces, and Maker Faires are popping up all over the world and continually increasing in size and participation". Today, educational platforms like school tech-labs provides making spaces to to strengthen and associate the many individuals and organizations that seek to integrate and study making as a means of learning (Sheridan et al,2014).

Makerspace provides not only the right environment for making but also provides the right tools for making. Tools are therefore vital aspects in a makerspace and these tools range from high-tech tools to very simple tools necessary to make especially in the context of makerspace for children. The tools and materials required in makerspaces will be determined by the activities chosen for your making, desire outcomes and budget, (Compton, et. al., 2014). Some of the common tools and materials in makerspaces especially for children in the school library environment include scrapbook paper, letter stickers, pipe cleaners, string, ribbon, crayons, sticky notes, elastics, magnets, pins, colored plastic, model magic, cardboard, wood, plastic, Styrofoam, beads/buttons, popsicle sticks, FischerTechnik, LEGO, K'NEX, soldering irons, 3D, milling machine and Laser cutter.

The Concept of Creativity in Children in Relation to Makerspace

Creativity is defined by Sefertzi (2000 p.2) as "the generation of new ideas or the recombination of known elements into something new, providing valuable solutions to a problem". Creativity is closely tied to innovation as it generates the basis for innovation. Thus, it is not possible to conceive innovation without creative ideas, as these are the starting point, (European Commission, 1998). In understanding creativity as a concept, Runco and Jaeger (2012) posited that:

> *"Creativity refers to the abilities that are most characteristic of creative people. Creative abilities determine whether the individual has the power to exhibit creative behaviour to a noteworthy degree. Whether or not the individual who has the requisite abilities will actually produce results of a creative nature will depend upon his motivational and temperamental traits". (Runco & Jaeger, 2012 p. 94).*

According to Boden (1998), there are three main types of creativity, involving different ways of generating the novel ideas:

1. The "combinational" creativity: involves new combinations of familiar ideas.
2. The "exploratory" creativity: involves the generation of new ideas by the exploration of structured concepts.
3. The "transformational" creativity: involves the transformation of some dimension of the structure, so that new structures can be generated.

Creativity in children can be enhanced according to Csikszentmihalyi in Antonites (2003) by improving their cognitive level, exposing the, to social environment that spurs creative thinking and exposing them to stimulating conversations as well as role models. These are some of the opportunities provided by makerspace which helps to develop the creative nature of children. Hence, making is a prerequisite to facilitating creativity in children. This is corroborated by Schrock (2014) who asserts that makerspaces are open-access workshops devoted to creative and technical work for individual tinkering, social learning, and group collaboration on innovative, community building and technological projects. It can therefore be extrapolated that makerspaces which is a dedicated and equipped environment for making enhances the creativity of children.

The concept of making has long been in existence; pre-existed and co-existing along civilization which has always been an instrument for development. The need for individuals to produce goods or commodities (making) is tantamount to economic growth and development. Making according to Stager (2017) gives individual positive view and perception about the world; confidence and competence required to solve problems. Thus makers usually tend to have a positive perception of situations with "I-can-do-it" mentality. They therefore develop a habit for experimenting which instills in them a learning culture necessary to nurture the curiosity, exploration and collaboration that comes with experimenting, (Maker media, 2013). Meanwhile, the outcome of every successful experiment is invention or making and makerspace provides such opportunity.

Makerspace connects people from various disciplines and spur them in the arts of creation, critical thinking, collaboration and communication, (Feinstein, DeCillis& Harris (2016). Thus, makerspace is the engine room for creativity which is required for sustained development and in turn, creativity is central to making. Therefore, organized making in makerspace is fundamental in enhancing creativity in children who are key target of makerspace movement due to their formative age. While schools are established for the cognitive development of a child, makerspace support this objective by helping children cultivate idea(s) and engage them in the process of making and testing out the ideas towards a finished product, (Brahms & Crowley, 2015).

It is pertinent to state that the degree, level or extent of making varies across different age groups. For children, making is a new culture of learning which according to Honey and Kanter (2013) helps to engage new and traditional users of informal learning spaces. Thus, makerspace helps children to learn creatively and practically, a more robust pattern of learning resulting to a shift in the educational system which takes making into the classrooms. Province of British Columbia (2013) notes that a "contemporary research from Stanford University suggests that when we tinker with complicated and engaging tasks, make mistakes, and encounter failure, we do the intellectual wrestling that fosters the development of brain synapses, which build brain plasticity and intelligence". This new style of learning by children made possible through makerspace in school libraries enhances creativity in them which in future will birth innovation.

The Role of Makerspace in Facilitating Connectivity and Learning by Children

The makerspace environment is one that presents an environment where children can connect and learn valuable skills especially in the field of science, technology and mathematics. Roush (2009) was of the view that the principle driving the establishment of makerspace is one that has as its roots the need

for sharing tools, equipment, expertise and ideas. This indicates that children have the opportunity to meet their colleagues who are also interested in the art of making things. The environment is one that is not built solely on individualism, but one that thrives on cooperation which will not be possible without children coming together to share tools, equipment and knowledge. That is why more and more schools especially in the West are concerned about how to establish makerspaces in their school libraries (Weisgrau, 2015).

In addition, Hamilton (2012) noted that makerspace allows for learning that is participatory in nature. This becomes evident because as children connect together in working on an idea in the makerspace, in the course of their participation, they all learn from the process and the benefits spread to all. This aligns with the principles of participatory learning highlighted by Project New Media Literacies and outlined by Jenkins (2011). The principles include; heightened motivation and new forms of engagement through meaningful play and experimentation, learning that feels relevant to pupils' identities and interests and opportunities for creating using a variety of media, tools and practices. Others are; co-configured expertise where educators and students pool their skills and knowledge and share in the tasks of teaching and learning and lastly, an integrated system of learning where connections between home, school, community and world are enabled and encouraged.

The makerspace within the school library environment ensures that all these principles of participatory learning are upheld. The opportunity and the tools provided in the makerspace could motivate the students to try out new things that are of interest to them. The environment also provides the space for teachers especially those who are in the field of science, engineering, mathematics and arts and crafts to collaborate with the students in making things. In addition, it is expected that what pupils learn in the makerspace will be part of him or her and when he or she gets home; the skills could be shared with siblings, friends and neighbours. Before long, an idea that started out in the makerspace within the school library could be all over the community.

Weisgrau (2015) noted that parts of the roles of makerspace include: opportunity for students to learn informally, provision of a space that is interdisciplinary in nature and provision of equitable access to materials and resources. The makerspace should provide an environment that is not rigid and structured like the classrooms, rather it is an informal environment where students could have the opportunity to connect with friends and can pursue the idea of making things that are of interest to them. Though they could be guided but not limited to what the teachers want them to make. This is in line with the submission of Kurti, Kurti and Fleming (2014) who observed that the education this is received by pupils in makerspace is not teacher-driven but student driven.

The makerspace also ensures that pupils connect and learn not just a particular discipline but different disciplines that are of interest to them. Since the principal focus of makerspace is to build the cognitive abilities of pupils in areas of science, engineering, mathematics and entrepreneurship, they need an all-round knowledge that will not be narrowed or stereotypic. The importance of this was echoed by Davee, Regalla and Chang (2015, p. 10) who pointed out that "ultimately, the interdisciplinary and empowering natures of these makerspaces can help prepare youth for a future we can't yet imagine". This is of particular within the context of Nigeria as there is a need to start planning for the future now and this cannot be successful without technology.

Furthermore, makerspaces facilitate connectivity and learning through the opportunity provided for all pupils to access materials and resources. In a situation where pupils are not restricted to use the maker tools, they will have the opportunity of laying their hands on them, try making things of interest and in the process, even though they may not be successful at first, they would have learnt in the process. Fleming (2015, p. 27) said "Every child has the right to invent, tinker, innovate, make and do". Thus, to ensure that pupils within the school library enjoy these rights to the full, it is very important for the personnel in charge of the makerspace to educate the pupils on this. With access to resources and materials in the makerspace, pupils will could be very active, innovative, creative, identify problems and discuss their thinking with the colleagues (Craft, 2005).

From the foregoing, it is clear that makerspace has the potential of turning passive pupils into very active and innovative makers. Therefore, in order to support the idea of makerspace within

Nigerian school libraries and as such create an environment where pupils can connect, learn and create, there is the need for the relevant stakeholders to perform their roles. The stakeholders include the school management, subject teachers and school librarians. The next subheading will examine the roles of these stakeholders.

The Role of Stakeholders in Facilitating Children's Creativity, Connectivity and Learning through Makerspace

The concept of makerspace is one that should be embraced by all stakeholders connected to primary and secondary schools in Nigeria irrespective of the seemingly daunting challenges that face the country at the moment in terms of inflation and huge infrastructural deficit. These challenges if care is not taken may deter the stakeholders from giving establishment of makerspace within the Nigeria school libraries the support needed. Oyewole and Anenene (2016, p. 177) identified one of the very obvious challenges by stating that "Nigeria is a country battling with issues of regular supply of electricity to the populace which has caused and still causing setbacks for economic development". However, the further authors noted that, despite the challenge of electricity and the expensive cost of acquiring the traditional tools needed for the makerspace, it is still possible for makerspaces to be established in Nigeria, as it could call for idea domestication if need be.

Therefore in a situation whereby school management, subject teachers and school librarians who are stakeholders in ensuring that Nigerian pupils learn, connect and are creative have a positive perception and a determined outlook towards makerspace, then it will materialise. This is very important as O' Connell (2015) noted that makerspaces located in school libraries are a powerful means to reinvent the libraries into the digital age. A school is as good as it library. As a result, a school with a restructured school library which has a makerspace, will produce pupils who would have knowledge in different subjects, will the necessary skills and ideas needed for survival in this digital age.

The school management has a very strategic role to play in ensuring that the creativity and learning of pupils are facilitated through the makerspace. Kurti, Kurti and Fleming (2014) stated that no makerspace can survive and thrive without a supportive environment. Within the Nigerian context, schools are managed by civil servants and employees of private individuals or organisations who are mostly religious in nature. In the primary schools, these individuals are called head masters or head mistresses, while in the secondary schools they are the principals and the vice principals. It is very important for these individuals after having a clear picture and having being convinced of the benefits of makerspace, to solidly support the arrangement for it to succeed.

The management of government owned primary and secondary schools in Nigeria with functional school libraries have the responsibility of informing the governmental authorities of the benefits associated with the creation of makerspace within the libraries. This is because, for makerspace to facilitate creativity, connectivity and learning, it has to be in existence and the need for government support is important in this. A meeting can be scheduled with the commissioner or the permanent secretary of the ministry of education to spell out in clear terms the gains of having a makerspace in the school libraries. If government realise that pupils have the opportunity to learn different skills software development, 3D design, hand-sewing, bead making, soap making etc, they might provide financial assistance that will make it possible for makerspaces to be established in the school libraries.

Similarly, those in the management position of schools owned by private individuals or organisations also need to convince their financiers the need for them to have a 21st century school library that will be able to render a world class service. Even if government finds it quite difficult to key into this arrangement, serious minded individuals and organisations that are out to make a difference in the education they provide should support the establishment of makerspaces within school libraries. Even if initial discussions fail to bring about the desired result, individuals in management positions need to be resolute and employ continuous persuasion. When heads of schools perform this role and it yields fruitful result, which is the establishment of makerspaces in the school libraries, pupils will have the space where they can connect, learn and be creative.

Furthermore, the teachers are also important stakeholders in ensuring that makerspaces become operational in school libraries in Nigeria

to the benefit of the pupils. In the first instance, all teachers especially those who teach subjects in the fields of science, technology, mathematics and engineering need to make the case for the establishment of makerspace in the school library. Teachers even have more roles to play when makerspace has been established in the school library. The teachers need to stimulate the children's interest during classes to make use of the makerspace not only to learn but to collaborate with their colleagues in pursuing projects that are of interest to them under the guidance of the librarian. The more the teachers talk about the need for the pupils to embrace the maker concept, the more interested they will be.

In addition, it is also vital for the teachers to collaborate with the personnel in charge of the makerspace in order for them to schedule the time when it would be most appropriate for the pupils to use the makerspace. This will in turn ensure that the pupils can learn their regular subjects and still use of the makerspace to pursue their passion without interference and disturbance. If this is not done, the students may be occupied with the stress and demands from their regular subjects that they might not have the time to use the makerspace throughout the week. In fact, this collaboration could give the opportunity for the teachers, especially those who teach subjects with contents that involve practical to synchronise the teaching of those contents in the classroom with practical in the makerspace.

Moreover, the school librarian also is an important stakeholder in ensuring that makerspace facilitates the creativity and learning of pupils. Bell (2015) quoted Leslie Preddy, the then president-elect of the Chicago-based American Association of School Librarians who stated that school librarians have long be overlooked when it comes to the issue of facilitating the creative ability in student, which was described as an important role of school librarian. The makerspace is a facility that could assist the school librarian to facilitate creativity in children. But this can only be done when school librarians lobby their managements and teachers on the importance of creating a makerspace that will exist side by side with the school libraries. The more school librarians effective table the case for the creation of makerspaces before other stakeholders, the more the likelihood of getting their support. The school librarian really needs to get the support of the management because there may be need for the school library to be redesigned or an extension made to the already existing structure. All these call for funds.

Also, the school librarian has the role of ensuring that the needed tools or materials needed to run the makerspace are itemised, justified and presented to the management. This will allow the management to look into it and determine those that can be acquired immediately and those that may have to be on the waiting list as a result of funds. Even if limited funds are provided, the school librarian has the responsibility of judiciously utilising the available resources to acquire the not so expensive tools and as time goes on with the success of the makerspace, extra support may be provided. It is not compulsory that a 3D printer must be available before the makerspace becomes operational.

Once a makerspace has been created in the school library, the librarian need to invite curiosity, invite wonder and encourage playfulness (Kurti, Kurti & Fleming, 2014).The school librarian can invite curiosity and wonder by being innovative and creative with the tools provided in the makerspace. If possible, the school librarian can display already made products from the tools in the makerspace in conspicuous areas in the library. If the pupils see this, they might start wondering and before long they could approach the school librarian and inquire. This will be an opportunity for the school librarian to provide orientation about the makerspace. In addition, when the pupils start using the makerspace, the school librarian should encourage them to use the materials to make things that are of interest to them. The pupils should be helped to know that the environment is not rigid; as such they can play with the materials with their peers.

Apart from this, the school librarian has the responsibility of assisting the children to acquire different skills that are of interest to them. In as such as the makerspace is within the school library, the librarian should also take an interest into what is going on and if possible at times schedule training programs in form of workshop to impart skills where there is a form of competence. The goal of the school librarian ought to be that before pupils leave the primary or secondary schools, they are exposed to the art of making, appreciate the need to connect with others and also widen their learning options.

Summary of the Findings

In order to succinctly show how the reviewed literature has responded to the objectives raised to guide the study, the following are the summary of the findings:

i. Making is not a new concept, but having a dedicated environment or space for making with tools, makers and mentors (makerspace) was amplified by the Maker magazine in 2005, the Obama's speech of 2009 on "educate to innovate" and the White House organized Maker Faire in 2014, which spurred several others all around the world.
ii. Makerspace is the engine room for creativity either combinational, transformation or exploratory, and creativity is in turn, central to making.
iii. Makerspace creates an atmosphere where a maker connect with his or her inner self by probing and tasking the mind; with others, by promoting cooperation, knowledge sharing, teamwork and collaborative learning; and with the society through innovation which is usually the outcome of creativity enhanced by makerspace. Also, in this environment the makers engage in participatory learning, a crucial strategy that makes learning permanent.
iv. The stakeholders of makerspace in schools include school management, teachers and school librarians or media specialist. The role of school management is primarily to lobby for makerspace. The teachers are expected to advocate for makerspace, hence, creating awareness and arousing interest. While the school librarian among other things, organise and execute makerspace projects in collaboration with other stakeholders.

Conclusion and Recommendations

The future of any nation, like Nigeria is the children and if the future is one that will be filled with advancements, the creative abilities of children must be harnessed today. The place of makerspace located within the school libraries in facilitating creativity in children is not in doubt as revealed by the examples in Europe and America. That is why it is very important for stakeholders within the Nigerian school system not to jettison the concept of makerspace in school libraries in Nigeria. The country cannot afford to keep producing students with no practical knowledge and creative abilities, while other nations are miles ahead. If Nigerian children are exposed to the concept of making through makerspaces within their school libraries at a very young age, they might grow up into adults who would pioneer and sustain industrial and technological revolution in the country.

Based on the conclusion, the following recommendations are made:

1. School owners like the government, private individuals and organisations should not only invest in buildings but also invest in the intellectual pillar of the school which is the school library. They should ensure that school libraries are designed with makerspaces so that they can produce all-round pupils with knowledge and skills that are contemporary.
2. School teachers should prevail on the management to establish makerspaces within the school libraries. If the problem is insufficient finance, they could suggest ways of realising funds to the management. For government owned school, willing alumni with philanthropic spirit can be contacted. Whilefor private schools, a list of some parents who could help can be provided.
3. School librarians need to acquire basic practical skills in computing and crafts that will enable them to impart the knowledge in the pupils.
4. School librarians also need to be abreast of the trends in makerspaces as it obtains in Europe and America in order to move with the trend of time.
5. School librarians should make themselves available for training on makerspaces if organised by professional bodies like the Nigerian School Library Association, Nigerian Library Association and the Librarianship Registration Council of Nigeria.

References

Achterman, D. (2008). *Have, halves and have-nots: school libraries and student achievement in California.* Retrieved Novermber 19, 2017 from http://www.digital.library.unt.edu/ark:/67531/metadc9800/

American Association of School Librarians (2007). *Standards for the 21st-century learner*. Chicago: ALA. Retrieved October 15, 2017 from http://www.ala.org/aasl/standards

Antonites, A.J. (2003). *The concepts: Creativity, innovation and opportunity funding*. University

of Pretoria etd.

Bell, J. (2015, May 12). School librarians push for more maker spaces. *Education Week*. Retrieved August 27, 2017 from http://www.mobile.edweek.org

Bevan, B., Gutwill, J. P., Petrich, M., & Wilkinson, K. (2014). Learning through STEM-richtinkering: Findings from a jointly negotiated research project taken up in practice. *Science Education*, 99(1), 98-120.

Boden, M.A. (1998). Creativity and artificial intelligence.*Artificial Intelligence*, 103, 347-356

Brahms, L. & Crowley, K. (in press). *Making sense of maing: Defining learning practices in MAKER Magazine*. In K. Pepler, E. Halverson, & Y. Kafai (Eds). Makeology in K-12, Higher, and Informal Education: The Maker Movement and the Future of Learning. Routledge.

Compton, E., Amy Boese, A., Lewis , J., Teeri, S. & Yusko , S. (2014). *Making in the library toolkit: 2014 makerspace resources task force*. YALSA: Young Adult Library Services Association, American Library Association. Chicago

Craft, A. (2005). *Creativity in schools: tensions and dilemmas*. Retrieved from EBL Library.

Davee, S., Regalla, L. & Chang, S. (2015). *Makerspaces highlights of select literature*. Retrieved August 3, 2017 from http://www.makered.org/wp-content/uploads/2015/08/Makerspace-Lit-Review-5B.pdf

Dougherty, D. (2005). The Making of Make, *MAKE Magazine*, O'Reilly Media, Inc. P.7.

European Commission (1998).*Innovation Management Techniques in Operation*, European Commission, Luxembourg.

Feinstein, L., DeCillis, M.D. & Harris, L. (2016). *Promoting Engagement of the California Community Colleges with the Maker Movement.*California Council on Science and Technology. Retrieved December 19, 2017 from: http://ccst.us/publications/2016/2016makers.php

Fleming, L. (2015). *Worlds of making: best practices for establishing a makerspace for your school*. Thousand Oaks: Corwin

Hamilton, B.J. (2012). *Makerspaces, participatory learning and libraries.The Unquiet Librarian*. Retrieved December 7, 2017 from http://www.theunquietlibrarian.wordpress.com/2012/06/28/makerspaces-participatory-learning-and-libraries/

Honey, M. & Kanter, D. (2013) (Eds.) *Design, Make, Play: Growing the next generation of STEM innovator*s. London: Routledge.

Jenkins, H. (2011). *Shall we play? (Part Two)*. Retrieved August 8, 2017 from http://www.henryjenkins.org/2011/05/shall_we_play_part_two.html

Kachel, D. E. (2011). *School Library Research Summarized: A Graduate Class Project*. Mansfield University. Retrieved October 19, 2017 fromhttp://libweb.mansfield.edu/upload/kachel/ImpactStudy.pdf

Kurti, R.S., Kurti, D. & Flemming, L. (2014). Practical implementation of an educational makerspace: part 3 of making an educational makerspace. *Teacher Librarian*, 42 (2), 20-24. Retrieved August 8, 2017 from http://www.teacherlibrarian.com/2014/12/17/educational-makerspaces-2/

Kurti, S., Kurti, D.L. & Fleming, L. (2014). The philosophy of educational spaces: part 1 of making an educational makerspace. *Teacher Librarian: The Journal for School Library Professionals.* Retrieved Novermber 30, 2017 from http://wwwteacherlibrarian.com/2014/06/18/educational-makerspaces/

Lonsdale, M. (2003). *Impact of school libraries on student achievement: a review of the research*. Victoria, Australia: Australian Council for Educational Research. Retrieved December 19, 2017 fromhttp://research.acer.edu.au/cgi/viewcontent.cgi?article=1024&context=tll_misc

Maker media (2013). *Impact of the maker movement.* Deloitte Center for the Edge and Maker

Media from the Maker Impact Summit. Dec. 2013. Retrieved Septermber 19, 2017 fromhttp://www.makermedia.com/wp-content/uploads/2014/10/impact-of-the-maker-movement.pdf

Martinez, S. L., & Stager, G. (2013). *Invent to learn: Making, tinkering, and engineering in theclassroom*. Torrance, CA: Constructing modern knowledge press.

O'Connell, J. (2015). *Hackerspaces and makerspaces INF530 Module 5.4*. Retrieved October 5, 2017 from http://www.interact2.csu.edu.au/bbcswebdav/pid-24931-dt-content-rid-635373_1/courses/SINF530_201530_WD/module5/5_4_Hackerspaces_makerspaces.html

Oyewole, O. & Anenene, E.E. (2016) *Repositioning public libraries in Nigeria for economic development through the domestication of Makerspace: perspectives of librarians in Oyo State Public Library, Ibadan, Nigeria*. Proceedings of the 5th Annual Conference of the

Nigerian Library Association (NLA) Abia State Chapter, 14th-17th November, 2016

Peppler, K., Maltese, A. and Keune, A. (n.d). The maker Ed open portfolio project: Survey of

makerspace part 1,

Province of British Columbia (2013). *Taking making into classrooms: A toolkit for fostering curiosity and imagination*. Retrieved Novermber 19, 2017 from http://www.mytrainingbc.ca/maker/downloads/Taking_Making_into_Classrooms.pdf

Roush, W. (2009). *People doing strange things with soldering irons: a visit to hackerspace. Xconomy*. Retrieved Septermber 4, 2017 from http://www.xconomy.com/national/2009/05/22/people-doing-strange-thing-with-soldering-irons-a-visit-to-hackerspace

Runco, M.A & Jaeger, G.J. (2012). The standard definition of creativity. *Creativity Research Journal*, 24(1), 92-96.

Schrock, A. R. (2014). Education in Disguise: Culture of a Hacker and makerspace.*InterActions: UCLA Journal of Education and Information Studies, 10*(1).

Sefertzi, E. (2000). *Creativity*. Report produced for the EC funded projects. INNOREGIO:dissemination of innovation and knowledge management techniques.

Sheridan, K., Halverson, E., Litts, B., Brahms, L., Jacobs-Priebe, L., & Owens, T.(in press). Learning in the making: A comparative case study of three makerspaces. *Harvard Educational Review.*

Stager, G. (2017). *Unconventional wisdom about maker movement*. DA special report.

Trilling, B. (2010). From libraries to learning libratories: The new ABC'sof 21st-century school

libraries. *School Library Monthly* 29 (1): 43 Retrieved December 17, 2017 fromhttp://www.schoollibrarymonthly.com/articles/Trilling2010-v27n1p43.html

Weisgrau, J. (2015). *School libraries and makerspaces: can they coexist?* Edutpoia, George Lucas Educational Foundation. Retrieved October 6, 2017 from http://www.edutopia.org/blog/school-libraries-makerspaces-coexist-josh-weisgrau

Williams, D. & Wavell, C. (2001). Recent research on the impact of the school libraryresource centre on learning. *School Librarian*, 49(3):123–7.