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# **Makerspaces in Schools: What Knowledge, Perception and Attitude of Teacher Librarians in Osun State Possess?**

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## **Abstract**

This study examined the knowledge, perception, and attitude of teacher librarians in secondary schools in Osun State towards makerspaces. A survey research design was used, and data was collected using a questionnaire. The sample for the study consisted of 110 teacher librarians from selected secondary schools in Osun State. The study found that teacher librarians in secondary schools in Osun State have sufficient knowledge about makerspaces, particularly when it comes to the ability to select technologies that improve student teaching and learning, understanding how to choose effective teaching ways to guide students' thinking and learning in makerspaces, possess experience with makerspaces, possess several methods and tactics for expanding their knowledge regarding makerspace, and can utilise makerspace to experiment, create, and learn new things. The study established that teacher librarians are open to integrating makerspaces into their schools and using them to support student learning. This survey indicated that as the knowledge and perception of teacher librarians about makerspaces improve, so does their attitude towards them. *This study recommends that* schools invest in the infrastructure and materials needed to support the integration of makerspaces into their libraries so that teacher librarians can effectively use them to enhance student learning.

**Keywords:** *Attitude, Knowledge, Makerspaces, Perception, Teacher librarian, Secondary school*

## **Background to the Study**

The educational landscape has witnessed a transformative shift driven by integrating technology and innovative pedagogical approaches in recent years. The change in the educational setting due to the technological revolution has also made it necessary for libraries to change to keep informed of the current development (Ogar & Dushu, 2018). Among these innovative trends, makerspaces have emerged as dynamic and creative learning environments that foster students' hands-on experimentation, collaboration, and problem-solving skills (Soomro et al., 2022). Makerspaces allow students to explore various tools, materials, and technologies, encouraging them to become active creators rather than passive consumers of knowledge (Nagle, 2021). According to Thompson et al. (2014), information creation and sharing in the modern world subsist in the realm of multimedia and physical objects, and to keep up with this new development, libraries must develop new ways of offering all-inclusive and engaging information services.

School libraries play a significant role in enhancing the quality of learning in Nigeria. School libraries have a multifaceted impact on students' education, fostering academic success, information literacy, and a lifelong love for learning (Merga, 2021). These impacts are supported by various studies, reports, and educational organisations in library science and education (Danladi&Yohanna, 2018; Youse, 2014). School libraries play a crucial role in students' educational development and success. They significantly impact various aspects of learning, including academic achievement, information literacy, cognitive skills, and a love for reading. As Aiyebilehin et al. (2018) observed, school libraries have evolved beyond traditional book repositories and embraced innovative concepts such as makerspaces. Makerspaces are creative and collaborative spaces where students can engage in hands-on learning, explore their interests, and develop skills through various creative and technical activities (Trust et al., 2018). As such, integrating makerspaces into school libraries offers numerous benefits.

Incorporating makerspaces into school libraries requires careful planning, resource allocation, and training for students and educators (Woods & Hsu, 2020). When implemented effectively, makerspaces enhance the overall learning experience and contribute to the development of well-rounded, skilled individuals prepared for the challenges of the 21st century (Choi et al., 2021). Makerspaces provide a platform for students to explore their creativity, experiment with ideas, and invent new solutions. This fosters innovation and critical thinking (Morado et al., 2021; Soomro et al., 2022). Makerspaces encourage experiential learning by providing students with tools, equipment, and materials to work on projects that align with their interests and passions (Kim et al., 2023). Makerspaces often incorporate elements of science, technology, engineering, art, and mathematics (STEAM). These spaces enable students to engage in interdisciplinary projects that bridge these subject areas (Gross & Gross, 2016). Makerspaces promote student collaboration and teamwork as they share ideas, resources, and skills to complete projects. This mirrors real-world collaborative work environments. Okpala (2016) states that makerspaces often incorporate digital tools such as 3D printers, coding kits, and electronics, exposing students to emerging technologies and promoting digital literacy.

The success of establishing a makerspace in a school is influenced by various factors, including the support and involvement of school management. School management plays a crucial role in ensuring that the makerspace is effectively integrated into the school's educational environment and that it aligns with the overall goals and vision of the institution (Dexter et al., 2019). The involvement and support of school management are pivotal for the successful establishment and operation of a makerspace in a school. Their leadership, resource allocation, collaboration, and commitment to the vision of the makerspace greatly contribute to its integration within the educational ecosystem and its positive impact on students' learning experiences (Schrum& Levin, 2016).

The school librarian is an important stakeholder in ensuring that the makerspace facilitates the creativity and learning of pupils. Oyewole & Igbinovia (2017) stated that school librarians are being overlooked when it comes to facilitating students' creative ability, which was described as an important role of school librarians. As a critical nexus of information dissemination and educational support, teacher librarians play a pivotal role in shaping the adoption and

effectiveness of school makerspaces. As information professionals, teacher librarians are at the forefront of promoting and integrating these innovative learning spaces. Teacher librarians are influential information professionals who play a significant role in moulding the integration and effectiveness of makerspaces (Aiyebilehin et al., 2018; Johnson et al., 2015). The extent to which teacher librarians possess the necessary knowledge, perceive the value, and hold positive attitudes towards makerspaces can profoundly influence their successful implementation and integration into the educational ecosystem (Alexander et al., 2017).

The attitudes of school librarians towards makerspaces can vary widely depending on factors such as their backgrounds, training, the school's culture, and their understanding of the concept (Hurst et al., 2019). Librarians may have varying levels of familiarity with the technologies and tools commonly found in makerspaces. Some might require professional development to feel confident in guiding students through makerspace activities. Some librarians might have concerns about the resources required to establish and maintain a makerspace. This includes budget constraints, acquiring the necessary equipment, and ensuring ongoing support. Concerns about equity and access could arise, as some librarians might worry that not all students have equal opportunities to engage with makerspaces due to various factors, including socioeconomic disparities (Igarashi et al., 2023).

In recent years, makerspaces have gained traction in various parts of Nigeria, especially in urban areas and some educational institutions (Inoma et al., 2020). The adoption of makerspaces was often driven by the increasing emphasis on technology, innovation, and hands-on learning in education. While makerspaces were gaining momentum, their adoption might not have been uniform across all regions and institutions due to challenges like limited funding, infrastructure constraints, and varying levels of awareness about the concept (Serholt et al., 2018). In the context of Osun State, located in southwestern Nigeria, the adoption of makerspaces in schools is gaining momentum, presenting a suitable area for exploration. Within this landscape, teacher librarians are influential information professionals who play a significant role in moulding the integration and effectiveness of makerspaces (Aiyebilehin et al., 2018; Tait et al., 2016). The extent to which teacher librarians possess the necessary knowledge, perceive the value, and hold positive attitudes towards makerspaces can profoundly influence their successful implementation and integration into the educational ecosystem (Alexander et al., 2017; Bers et al., 2018). Therefore, this study aims to delve into the nuanced dynamics that underlie the engagement between teacher librarians and makerspaces within Osun State. By investigating teacher librarians' knowledge, perceptions, and attitudes, this study seeks to uncover the driving forces that either bolster or hinder the adoption and optimisation of makerspaces.

### **Research Questions**

1. What is the level of knowledge of makerspace possessed by teacher librarians in secondary schools in Osun State?
2. What is the perception of teacher librarians in secondary schools in Osun State?
3. What is the attitude of teacher librarians in secondary schools in Osun State towards makerspaces?

## **Hypotheses**

The following hypotheses were tested 0.05 level of significance.

1. No significant relationship exists between knowledge and teacher librarians' attitudes towards makerspaces in Osun State secondary schools.
2. There is no significant relationship between teacher librarians' perception and attitude towards makerspaces in Osun State secondary schools.
3. There is no significant relationship between knowledge and perception of teacher librarians of makerspaces in secondary schools in Osun State.

## **Literature review**

Several literature reviews have been conducted on makerspaces in schools (Papavlasopoulou et al., 2017; Soomro et al., 2022; Wong & Partridge, 2016). One such review is "The State of Makerspace Research: a Review of the Literature," published in TechTrends in 2021 (Mersand, 2021). This review analysed 150 peer-reviewed studies using expanded activity theory as a framework to examine how researchers have explored various components in a makerspace and the outcomes for their users. The review found that despite widespread discussions about makerspaces and making in school library practitioner publications and conferences, there is a lack of research on making makerspaces and fab labs in PreK-12 school libraries in the United States.

Another systematic literature review by Soomro et al. (2022) was conducted to gain insight into makerspaces contribution to fostering creativity, particularly in STEM disciplines. It was found that 34 studies evaluated the impact of makerspace and associated technologies on students' creativity. These reviews provide valuable insights into the current state of research on makerspaces in schools and their potential impact on students' knowledge, perception, and creativity.

Makerspaces are considered an effective tool in the development of creative skills and positively affect users' thinking, ideas, and ability to produce creative solutions in various domains such as art, science, technology, and engineering (Culpepper & Gauntlett, 2020; Dede, 2010; Saorín et al., 2017). For instance, Schmidt (2019) described makerspaces as "creative labs" and places for social innovation that foster individual creativity and learning, leading to knowledge and value. Culpepper and Gauntlett (2020) conceived makerspaces as creative platforms for making and learning activities supporting creative and curious individuals.

The literature reports that digital editing tools and 3D printers help develop engineering students' creative abilities (Saorín et al., 2017), describing a strong connection between the makerspace environment and its creative tools. However, such studies are specific to particular aspects of creativity (either person or environment) and the makerspace. Makerspaces are essential for STEM education due to their capability to promote 21st-century skills, such as creativity, critical thinking, problem-solving, and collaboration, and to improve confidence in K-12 and higher education students (Abdurrahman et al., 2019; Blackley et al., 2017). For instance, Blackley

et al. (2017) studied makerspaces' capability to improve students' confidence in STEM education. Hachey et al. (2021) investigated makerspace-based pedagogy development in kindergarteners' STEM identity development.

Despite the importance of makerspaces in STEM education, limited studies have been conducted on the teacher librarian's creativity, knowledge, perception, and attitude in school libraries. Considering STEM literature and creativity, Aguilera & Ortiz-Revilla (2021) conducted the most comprehensive SLR on STEM education's potential to develop students' creativity. They showed that STEM education positively affected students' creativity but disregarded the relationship between creativity and makerspaces.

As makerspaces have begun to move into classrooms and school libraries, a growing need for teacher-librarian professional development has been growing. Maker leaders have recommended that such training include workshops and seminars to encourage more maker-oriented practices in formal learning contexts (Okpala, 2016). Therefore, teacher librarians must be prepared to implement appropriate service delivery methods by using complex technologies, solving technical problems, and adapting to new circumstances (Honey, 2013; Kachel, 2011). In other words, to develop teacher librarians' capabilities to collaborate with teachers in teaching design literacy to children in the makerspace context, their mindset has to be developed. They need to build a collection of working with diverse materials, advanced technical equipment, and software applications and be able to devise new educational practices.

Makerspaces in schools have been gaining popularity in recent years to promote hands-on, interdisciplinary learning through play and experimentation (Soomro et al., 2022). These spaces allow students to create, rather than consume, using various tools and materials. While there is no one-size-fits-all approach to creating a makerspace, successful makerspaces often share common elements, such as promoting learning through play and experimentation, being cross-disciplinary, and offering tools and materials that encourage students to create.

Teacher-librarians are key in establishing and maintaining makerspaces in schools that house their maker tools and materials in libraries (Hughes & Morrison, 2022). Through open-ended interviews and on-site observations, researchers have identified three key responsibilities that teacher-librarians take on to ensure the smooth operation of the makerspaces: setting up tools, materials, and activities; collaborating with teachers to plan maker activities related to curricular goals; and facilitating the spread of maker culture throughout the school.

Makerspaces have helped to reinvigorate the core values and roles of librarianship, drawing attention to new ways of understanding the role of libraries in contemporary knowledge society (O'Donnell & Anderson, 2022). Makerspaces have the potential to help libraries redefine themselves by providing new forms of exchange and engagement with and amongst the communities they serve. However, for many libraries, especially those located in underserved communities that may lack adequate financial and human resources, the ability to design and manage a makerspace that meets both their internal capacity and the expectations and needs of their respective communities (e.g., public, academic), may be difficult without proper training, guidance, and support.

## Research Methodology

The study targeted a population of 110 teacher librarians who were purposively selected from secondary schools in Osun State, Nigeria, with functional libraries and makerspaces. The total enumeration method was used to include all 110 teacher librarians from the selected secondary schools in Osun State, Nigeria, as the sample for the study.

This study used a questionnaire as the primary instrument for data collection. The questionnaire is divided into four sections. The first section captures demographic information about the respondents, such as their sex, age, profession, library name, marital status, highest educational qualification, and designation. The second section focuses on the respondents' knowledge of makerspaces and consists of 10 items. The third section gathers data on the respondents' perception of makerspaces, consisting of 15 items. The fourth section consisting of 7 items, answered respondents' attitudes toward makerspaces. A 4-point Likert scale (Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1) was used to measure the respondents' evaluation of makerspaces.

The questionnaire was pilot tested on 20 teacher librarians from secondary schools not included in the main study. The data collected was analysed using the Cronbach Alpha method to assess the reliability of the questionnaire. The results showed that the reliability coefficients for the different sections of the questionnaire were: Knowledge of makerspaces = 0.83, Perception about makerspaces = 0.79, and Attitude towards makerspaces = 0.84. The overall reliability coefficient for the questionnaire was 0.81, indicating that it is a reliable tool for measuring teacher librarians' knowledge, perception, and attitude towards makerspaces.

The data collected for this study was collated and analysed using the Statistical Package for the Social Scientists (SPSS) software. Descriptive statistics, including percentages, means, and standard deviations, were used to answer research questions 1 to 3. The three hypotheses were tested using Pearson's product-moment correlation at a significance level 0.05.

## Data Analysis and Discussion of Findings

A total of 110 questionnaires were distributed to the respondents. The demographic data shows that most respondents (45.0%) are between the ages of 26 and 35, while 42.0% are between 36 and 45. This means that most respondents (87.0%) are 26-45 years old, indicating that most teacher librarians in secondary schools in Osun State, Nigeria, are in their active years of service. Regarding gender distribution, the data reveals that most respondents (58.0%) are female. In comparison, only 42.0% are male, suggesting that there are more female teacher librarians in secondary schools in Osun State. This finding differs from that of Issa&Nwalo (2008), who reported that there are slightly more male teacher librarians than females in school libraries in Nigeria.

**Research question 1:** What is the level of knowledge of makerspaces possessed by teacher librarians in secondary schools in Osun State, Nigeria?

Table 1: Level of Knowledge of Makerspaces Possessed by the Respondents

Strongly Agree (SA) Agree (A) Disagree (D) Strongly Disagree(SD) (n=110)

S/ N	Item Description	SA(%)	A(%)	D(%)	SD(%)	$\bar{X}$	SD	Decision
1	I possess the ability to select technologies that improve student teaching and learning.	28.67	65.33	2.00	4.00	3.15	0.65	Agree
2	I understand how to choose effective teaching ways to guide students' thinking and learning in makerspaces.	26.00	65.33	5.33	-	3.11	0.61	Agree
3	I possess experience with makerspaces.	28.67	67.33	3.33	0.67	3.27	0.77	Agree
4	I possess several methods and tactics for expanding my knowledge regarding makerspace.	29.33	66.00	4.00	0.67	3.23	0.73	Agree
5	I can utilise makerspace to experiment, create, and learn new things.	26.67	70.00	2.67	0.67	3.23	0.73	Agree
6	I am not well-versed in makerspace.	2.00	1.33	68.67	28.00	1.50	0.07	disagree
7	I understand the goal and purpose of a makerspace.	37.33	60.67	1.33	0.67	3.35	0.85	Agree
8	I'm unaware of how to use the technologies available in the makerspace to create activities.	2.67	-	36.00	61.33	1.11	0.02	disagree
9	I cannot assess and choose new information resources and technical advancements based on their suitability for a specific task.	1.33	0.67	45.33	52.67	0.99	0.05	disagree
10	I cannot use the tools provided to foster higher-order thinking abilities, problem-solving, critical	2.00	-	30.67	67.33	1.31	0.03	disagree



	thinking, decision-making, and innovative ideas.							
	Mean value					2.42		

Decision Rule: 0.1 to 1.0 = Not Knowledgeable; 1.1 to 2.0 = Fairly Knowledgeable; 2.1 to 3.0 = Knowledgeable; 3.1 to 4.0 = Highly Knowledgeable

Table 1 presented results on the level of knowledge of makerspaces possessed by teacher librarians in selected secondary schools in Osun State. The result of the analysed data revealed that most of the respondents agreed that they possess the ability to select technologies that improve student teaching and learning ( $\bar{X} = 3.15$ ), understand how to choose effective teaching ways to guide students' thinking and learning in makerspaces ( $\bar{X} = 3.11$ ), possess experience with makerspaces ( $\bar{X} = 3.27$ ), possess several methods and tactics for expanding my knowledge regarding makerspace ( $\bar{X} = 3.23$ ), can utilise makerspace to experiment, create, and learn new things ( $\bar{X} = 3.23$ ) and understand the goal and purpose of a makerspace ( $\bar{X} = 3.35$ ). The implication to be drawn from this is that teacher librarians in secondary schools in Osun State possess knowledge of selecting technologies that improve student teaching and learning, selecting effective teaching ways to guide students' thinking and learning in makerspaces, possess experience with makerspaces, possess several methods and tactics for expanding their knowledge regarding makerspace, can utilise makerspace to experiment, create, and learn new things, and understand the goal and purpose of a makerspace.

Based on the decision rule applied, it can be concluded that the respondents know makerspaces since the weighted mean calculated was 2.42, which falls within the range of 2.1 to 3.0. This implies that teacher librarians in secondary schools in Osun State are familiar with makerspaces. This finding is consistent with Moorefield-Lang (2015), who reported that school librarians are beginning to become familiar with emerging innovations such as makerspaces and other creative spaces to meet the needs of their library users in terms of creativity, socialisation, education, and innovation.

**Research question 2:** What is teacher librarians' perception in Osun State secondary schools about makerspaces?

**Table 2: The Perception of Respondents about Makerspaces**

S/N	ITEM	SA (%)	A (%)	D (%)	SD (%)	$\bar{X}$	SD	Decision
1	It is an innovative environment for learning new skills.	90.00	9.33	0.67	-	3.89	1.39	Agree
2	Stakeholders (teacher librarians, subject teachers, and school administration) all have	94.67	5.33	-	-	3.95	1.45	Agree

	a role to play.							
3	Makerspaces can boost children's activities.	68.00	30.67	0.67	0.67	3.71	1.21	Agree
4	Makerspaces are gathering places for people to create and invent within a community of creators.	96.00	2.67	1.33	-	3.95	1.45	Agree
5	Scrapbook paper, letter stickers, pipe cleaners magnets, plus, coloured plastic, model magic, cardboard, wood, plastic Styrofoam, Beads/buttons, Pop side sticks, fisher technical LEGO, K'NEX, 3D, milling machine, and Lazer cutter are makerspaces materials	91	7	2		3.91	0.92	Agree
6	Makerspace brings together people from diverse fields.	36.00	61.33	2.00	0.67	3.33	0.83	Agree
7	Conventional library spaces combined makerspaces with the utilisation of technology for learning and practice	42.00	52.67	3.33	2.00	3.33	0.83	Agree
8	I am aware of how my work contributes to the growth of makerspaces.	74.67	24.00	0.67	0.67	3.73	1.23	Agree
9	In a well-designed area, the librarian notifies the reader about the availability of the makerspace.	20.00	78.00	0.67	1.33	3.17	0.67	Agree
10	Librarian training does not prepare me to use	26.00	28.00	22.00	24.00	2.33	0.41	Agree

	makerspace resources efficiently.							
11	The library does not provide the most assistance to makerspace users.	23.33	21.33	26.00	29.33	2.11	0.32	Disagree
12	My place of work does not allow me to use my talents, expertise, and skills.	25.33	26.00	24.67	24.00	2.53	0.03	Agree
13	Makerspaces do not promote early literacy or lifetime learning.	5.33	7.33	34.67	52.67	1.42	0.24	Disagree
14	Makerspaces do not allow learners to use the appropriate tools for making.	11.33	10.67	10.67	67.33	1.23	0.11	Disagree
15	Makerspace does not provide room for continuing education, human resources development, or community development.	20.67	22.00	12.67	44.67	2.27	0.05	Disagree
	Mean value					2.92		

Table 2 shows the result of the perception of the respondents about makerspaces. It showed that most respondents attested that; makerspace is an innovative environment for learning new skills (90%); stakeholders (teacher librarians, subject teachers, and school administration) all have a role to play. (94.67%), Makerspaces can boost children's activities (68%); Makerspaces are gathering places for people to create and invent within a community of creators (97%), scrapbook paper, letter stickers, pipe cleaners magnets, plus coloured plastic, model magic, cardboard, wood, plastic Styrofoam, Beads/buttons, Pop side sticks, fisher technical LEGO, K'NEX, 3D, milling machine, and Lazer cutter are makerspaces materials (91%), Conventional library spaces combined makerspaces with the utilisation of technology for learning and practice (92.67%), are aware of how their work contributes to the growth of makerspaces (74.67%), and that in a well-designed area, the librarian notifies the reader about the availability of makerspace (98%). The results suggest that teacher librarians in secondary schools in Osun State view makerspaces as innovative environments for learning new skills. Furthermore, the data indicates

that all stakeholders have a role to play in implementing makerspaces. This implies that the successful integration of makerspaces into schools requires the involvement and cooperation of all parties involved, including teachers, students, administrators, and parents.

Also, the teacher librarians perceived that makerspaces could boost children's activities; Makerspaces are gathering places for people to create and invent within a community of creators, scrapbook paper, letter stickers, pipe cleaners magnets, plus coloured plastic, model magic, cardboard, wood, plastic Styrofoam, Beads/buttons, Pop side sticks, fisher technical LEGO, K'NEX, 3D, milling machine, and Lazer cutter are makerspaces materials, Conventional library spaces combined makerspaces with the utilisation of technology for learning and practice, are aware of how their work contributes to the growth of makerspaces, and that in a well-designed area, the librarian notifies the reader about the availability of makerspace.

Based on the results, it can be concluded that teacher librarians in secondary schools in Osun State have a positive perception of makerspaces. This is because the weighted mean of 2.92 calculated for their perception is greater than the criterion of 2.50 set for a positive perception of makerspaces. In other words, the data suggests that most teacher librarians in secondary schools in Osun State view makerspaces positively.

**Research question 3:** What is the attitude of teacher librarians in secondary schools in Osun State towards makerspaces?

**Table 3: Attitude of School Library Personnel Towards Makerspaces**

S/ N	Items	SA (%)	A (%)	D (%)	SD (%)	$\bar{x}$	SD	Decision
1	Makerspaces in libraries have provided users with additional benefits.	59.33	22.67	14.00	4.00	3.33	0.83	agree
2	I am confident that the introduction of makerspaces will provide me with access to several innovations.	60.00	33.33	12.67	2.67	3.68	1.18	Agree
3	Because of the vast availability and accessibility of technology, the library's image can be improved through makerspace.	64.67	11.33	19.33	4.67	3.35	0.85	Agree
4	Opening the library to other activities such as seminars, workshops, and other student activities might be	5.33	24.00	6.67	64.00	1.07	0.15	disagree

	unpleasant.							
5	I dread spending too much time in the library because of the noise and distractions from the makerspace unit.	3.33	12.67	36.00	48.00	1.28	0.11	disagree
6	Foot traffic in the library, owing to makerspaces, disturbs me.	25.33	23.33	26.00	25.33	2.87	0.37	agree
7	The chaos and storage of materials used for various activities (e.g., clay making, cardboard making, painting) make me dislike the library's makerspace.	18.00	17.33	62.67	2.00	2.97	0.47	agree
	<b>Mean value</b>					<b>2.66</b>		

Decision Rule: 0.01 to 2.0 = Negative Attitude; 2.1-2.4 indifferent attitude; 2.5 to 4.0 = Positive Attitude

Table 3 presents information about the attitude of teacher librarians in secondary schools in Osun State towards makerspaces. The results showed that most of the respondents attested that; Makerspaces in libraries have provided users with additional benefits (83%); they have confidence that the introduction of makerspaces will provide them access to several innovations. (93%) and that because of the vast availability and accessibility of technology, the library's image can be improved through makerspace (76%). Also, few of the respondents affirmed that foot traffic in the library owing to the use of makerspaces disturbs them (48.66%), and the chaos and storage of materials used for various activities (e.g., clay making, cardboard making, painting) makes them dislike the library's makerspace (35.33%). In determining the kind of attitude, the respondents have towards makerspace, a positive attitude was established because the weighted mean of 2.66 was greater than the criterion mean of 2.50 set for the positive attitude of respondents towards makerspace. The results suggest that teacher librarians in secondary schools in Osun State have a positive attitude towards makerspaces. This aligns with the findings of Oyewole & Igbiovvia (2017), who emphasised that makerspaces create an environment where they can connect with their inner selves by engaging with others, promoting cooperation, knowledge sharing, teamwork, and collaborative learning. This is provided that school librarians develop an interest in innovations, often due to creativity enhanced by makerspaces.

### Hypotheses

**There is no significant relationship between the knowledge and attitude of teacher librarians in secondary schools in Osun State towards makerspaces.**

Table 4.: Result of PPMC showing the significant relationship between knowledge and attitude of teacher librarians in secondary schools in Osun State towards makerspaces

Variable	Mean	Std. Dev.	N	r	p	Remark
Knowledge	2.42	0.45	110	.317**	.001	Sig.
Attitude of teacher librarians	2.66	0.62				

\*Sig. at .05 level

According to the results presented in Table 4, there is a significant positive correlation between the knowledge and attitude of respondents towards makerspaces ( $r = 0.317^{**}$ ). This suggests that as the knowledge of teacher librarians in secondary schools in Osun State about makerspaces increases, their attitude towards makerspaces improves. In other words, the more teacher librarians know about makerspaces, the more positive their attitude towards them.

**There is no significant relationship between perception and attitude towards makerspaces of teacher librarians in secondary schools in Osun State towards makerspaces**

**Table 5:** Result of PPMC showing the significant relationship between perception and attitude towards makerspaces of teacher librarians in secondary schools in Osun State towards makerspaces

Variable	Mean	Std. Dev.	N	r	P	Remark
Perception	2.92	0.75	110	.375**	.000	Sig.
Attitude of teacher librarians	2.66	0.62				

\*Sig. at .05 level

Table 5 presents a significant positive correlation between respondents' perception and their attitude towards makerspaces ( $r = 0.375^{**}$ ,  $N = 110$ ,  $p < 0.05$ ). This indicates that as the perception of teacher librarians in secondary schools in Osun State about makerspaces improves, so does their attitude towards them. In other words, the more positively teacher librarians perceive makerspaces, the more positive their attitude towards them.

**There is no significant relationship between the knowledge and perception of teacher librarians in secondary schools in Osun State towards makerspaces.**

Table 6: Result of PPMC showing the significant relationship between knowledge and perception of teacher librarians in secondary schools in Osun State towards makerspaces.

Variable	Mean	Std. Dev.	N	r	P	Remark
Knowledge	2.42	0.45	110	.345**	.000	Sig.
Perception of school library personnel	2.92	0.75				

\*Sig. at .05 level

According to the results presented in Table 6, there is a significant positive correlation between respondents' knowledge and their perception of makerspaces. This suggests that as the knowledge of teacher librarians in secondary schools in Osun State about makerspaces increases, their perception of makerspaces improves. In other words, the more teacher librarians know about makerspaces, the more positive their perception of them.

### Summary and Conclusion

The survey found that teacher librarians at Osun State secondary schools are familiar with makerspaces and have a positive attitude toward them. It was also revealed that teacher librarians are knowledgeable about picking technologies that improve students' teaching and learning processes and selecting effective teaching ways to guide students' thinking and learning in makerspaces. The teacher librarians' positive opinion stems from their perception of makerspaces as able to improve children's activities and as locations where people may design and invent among a group of makers. Teacher librarians in secondary schools in Osun State have a good attitude toward makerspaces because they see makerspaces in libraries as a space that provides users with additional benefits and that through makerspaces, students may learn more. Both knowledge and perception were found to have a positive correlation with teacher librarians' attitudes about makerspaces in secondary schools in Osun State, as did knowledge and perception of makerspaces.

### Recommendations

The following recommendations were made based on the findings from the study:

1. There is a need to ensure that makerspace activities align with educational objectives and curriculum goals. Integrating subjects like science, technology, engineering, arts, and mathematics (STEAM) can enhance the learning experience.
2. Librarians and educators should provide guidance and support while allowing students to explore and problem-solve independently. Be available to answer questions, offer suggestions, and facilitate discussions.
3. Students should be allowed to choose projects that interest them. Encourage them to take ownership of their learning by pursuing projects they're passionate about.
4. Teachers and librarians need to emphasise professional development to familiarise them with makerspace tools and concepts.

5. To allow the teacher librarian to interact with the children at the makerspace area of the library, the school administration should designate time for makerspace sessions on the school schedule.
6. School management should invest in the infrastructure and materials needed to support the integration of makerspaces into their libraries so that teacher librarians can effectively use them to enhance student learning.

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