ADOPTION OF CHATBOTS FOR EFFECTIVE SERVICE DELIVERY IN ACADEMIC LIBRARIES OF NIGER STATE

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Abstract

*The study examined the awareness and adoption of chatbots by librarians for effective service delivery in academic libraries in Niger State, Nigeria. The adoption of chatbots is an emerging trend with limited research. The study was guided by four (4) objectives to explore the perceived concerns of librarians in Niger state, familiarity with **the** use of chatbot technologies, perceived impact of chatbot technologies on library services and user satisfaction and the primary expectations of librarians regarding the integration of chatbots in academic library services. Survey questionnaires were administered to 34 librarians across two (2) academic universities servicing postgraduate students in Niger State. A good number of respondents **were** comfortable with **the** use of digital technologies and need for formal training on chatbot implementation. Majority of **the** respondents believed chatbots will increase efficiency of library services. However, key concerns such as data privacy, employment implications and accuracy of information were raised. The study concludes that chatbot integration is essential for the evolving advancements library services and recommends training programmes for librarians, targeted policies and chatbot designs to meet the peculiarity of Nigerian library system.*

Key words: Academic Libraries; Artificial Intelligence; Chatbots; Technology; Library Services;

Introduction

The adoption of chatbot in academic libraries has gained attention as academic libraries seek innovative ways to improve library services and user experience. The mission of academic libraries is not limited to aggregating research resources and services, and communicating them to the research community. They also support the education at any particular higher education institution (Koltay et al, 2016). They are an important component in the tertiary educational services. Academic libraries are meant to be designed to provide library users with easy access that satisfies their daily educational needs. This can be made possible with the recent

technological advancement. Mckie & Narayan, 2019 proposed that information professionals need to adapt emerging technologies such as chatbots to improve and support library services. Chatbots have emerged as effective instruments with a wide range of potentials for implementation in library services (Fatouh & Hamam, 2024). Chatbots with artificial intelligence have the potential to augment academic library services, especially when it comes to research and reference support (Kaushal & Yadav 2022). Chatbots are essential as it can fill the gap of librarian's inability to work 24/7. It further provides users with information when librarians are unavailable. Chatbots have been around in developed countries libraries such as the United States of America but it is a new concept to libraries in Nigeria. Academic libraries wanting to advance the quality and efficiency of their operations may find automated systems as chatbots useful because of its capacity to stimulate human user conversations to deliver rapid and correct answers to a wide variety of topics (Adetayo, 2023). Artificial intelligence chatbots could perform services that could benefit scholarly communication and research. Given the increasing popularity of chatbots, so few academic libraries have employed the use of chatbots (Guy etal 2023).

Technological progressions can kindle many human abilities such as speaking, reading, grasping, remembering, calculating, and making judgments and collaborative learning. Artificial intelligence (AI) is a defining technology of the 21st century, creating new opportunities for academic libraries (Winkler & Kiszl, 2022). Which is probably much better understood as an evolving idea rather than a single technology Cox, 2023). Artificial Intelligence (AI) is perceived as an extension of human intellect and has taken over several sectors. It is the latest among the technologies currently being introduced in libraries. Application of Artificial Intelligence (AI) in libraries has been providing a discovery for the information sector. One of the significant implementation of artificial intelligence (AI) in virtual reference services is considered to provide a new online service model for libraries (Choukimath et al 2019).

Computer software programmes known as chatbots are created to simulate human conversation through audio or text (Panda & Chakravarty 2021). Chatbots in academic libraries are digital tools designed to interact with users through conversation (Guy et al., 2023). They allow users to carry on a conversation between a machine and a human interlocutor. Chatbots interact with the patrons in a way that feels like human-to-human conversation. An important predecessor of Chatbot's is the bot a software that is created to automate processes without human intervention (Villegas-Ch et al, 2021).

Mckie & Narayan (2019) proposed that librarians should start using new technologies, like chatbots, to make library services better and more innovative. To ensure these chatbots are successful, it's important to create a good user experience. The authors believe that librarians should work closely with the developers of these chatbots to make them useful, easy to use, trustworthy, and customizable for students. This collaboration is key to making sure the chatbot works well in a university setting. Kaushal & Yadav, (2022) highlighted chatbots can deliver diverse services and aid in research and scholarly communication. (Guy et al 2023 suggested

that adoption of chatbots may accelerate once precedent has been established and awareness of successful chatbot integration spreads to other institutions. Although they hold promise for improving the library experience and supporting research activities (Mckie & Narayan, 2019), their use in academic libraries is still limited. For instance, a survey of Canadian academic libraries revealed that only two were utilizing chatbots for reference services (Guy et al., 2023). Many stakeholders support the integration of chatbots, recognizing their potential to provide various services and facilitate research and scholarly communication (Kaushal & Yadav, 2022). However, there are concerns related to privacy, understanding complex tasks, and perceived risks (Kaushal & Yadav, 2022). Despite these issues, chatbots can enhance content accessibility on library websites and offer insights into user search patterns (Ehrenpreis & DeLooper, 2022). As libraries explore chatbot implementation, it's essential for librarians to work closely with developers to ensure the technology is practical, user-friendly, and adaptable for students (Mckie & Narayan, 2019).

Problem Statement

The field of library and information science has not seen the exponential growth in the use of artificial intelligence (AI) while other professions have. Despite all of artificial intelligence (AI) potentials in libraries, Nigerian university libraries have not yet embraced and effectively use chatbots. Only the University of Lagos Library in all of Nigeria has successfully adopted and used artificial intelligence for library services, according to studies of the literature (Oyetola et al., 2023). The difficulties that libraries are currently facing is a huge risk to the traditional role of librarians. Libraries, or better still, librarians are now struggling with technological disadvantage, inefficient operations, difficulty in retaining existing patrons and drawing in new ones, and an incapability to demonstrate value and assistances to all stakeholders. This might be due to lack of acceptance and understanding of artificial intelligence or low level of awareness and adoption of artificial intelligence's significance in libraries (Yusuf, et., 2022).

Although many stakeholders support the integration of chatbots, recognizing their potential to provide various services and facilitate research and scholarly communication, Chatbots haven't been predominantly adopted by most academic libraries (Kaushal & Yadav, 2022). Guy et al., 2023 carried out a survey of Canadian academic libraries and revealed that only two (2) out of One Hundred and Six (106) were utilizing chatbots for reference services. Mckie & Narayan, 2019 also supported this notion by emphasising that the use of chatbots in academic libraries is still limited. Guy et.,al 2023 suggested research areas for the future should include similar analysis in different areas and library types for understanding the use of chatbots in academic libraries. Chatbots use may guide a new paradigm in the field of library and information science systems and services, although there are currently very limited studies on the utilization of chatbots in the library and information science field (Mukherjee & Kumar 2023).

Objectives of the Study

The study was guided by the following objectives.

1. To ascertain the perceived challenges that library staff have regarding the introduction of chatbots in academic libraries.
2. To measure the extent of librarians' familiarity with chatbots in academic libraries.
3. To explore the perceived impact of chatbot integration on user experience and the efficiency of library services.
4. To ascertain the primary expectations of librarians regarding the adoption of chatbots into academic libraries.

Methodology

The total population of library staff in both universities is 105. A sum of 87 library staff of Federal University of Technology Minna, and 18 library staff of Ibrahim Gbadamasi Babangida library. This study adopted the survey design. The study population consists of 34 library staff in 2 academic libraries servicing postgraduate students in Niger State Nigeria, The study was limited to two (2) academic libraries, which are the Federal University of Technology, Minna Niger State and Ibrahim Badamasi Babangida University, Lapai, Niger State. The sample size is thirty four (34). The study was survey based with questionnaire used as the major instrument for the study. The questions consisted of likert scale and multiple choice questions. The data collected in this study was analysed using frequency analysis through excel to examine response patterns for a clear identification of dominant responses.

Results and Discussion

Table 1: Perceived Challenges that Library Staff have Regarding the Introduction of Chatbots in Academic Libraries (Multiple selection)

Concern	Frequency	Percentage
Data privacy and security	11	32.4%
Reduced human interaction	13	38.2%
Accuracy and reliability of information provided	19	55.9%
Potential bias in responses	8	23.5%
Overdependence on technology	9	26.5%
Impact on employment opportunities	14	41.2%
Lack of personalized support	8	23.5%
Misuse or abuse of the chatbot system	9	26.5%

Table 1 shows that majority of librarians major concern was about the accuracy and reliability of chatbot (55.9%). Reduced human interaction (38.2%) and impact on employment opportunities (41.2%) highlight fears that chatbots may replace human roles.Data privacy and security (32.4%) is another notable concern, indicating the need for strong security frameworks in chatbot implementation.

Table 2: Familiarity with Chatbots in Academic libraries

Level of Familiarity	Frequency	Percentage
Very Familiar	8	23.5%
Somewhat familiar	17	50.0%
Not familiar at all	9	26.5%

Table 2 shows that while 50% of respondents are somewhat familiar with chatbots, 26.5% are not familiar at all, showing that chatbot literacy is still developing. A strong majority (73.5%) are at least moderately comfortable using technology.

Table 3: Comfort Level with using Technology

Comfort Level	Frequency	Percentage
Extremely comfortable	8	23.5%
Moderately comfortable	17	50.0%
Slightly comfortable	7	20.6%
Not comfortable	2	5.9%
Not at all comfortable	0	0.0%

A strong majority (73.5%) are at least moderately comfortable using technology. This suggests prospects in readiness for chatbot integration but with necessary training because of 20.6% of respondents who are slightly comfortable and 5.9% of respondents who are not comfortable at all.

Table 4: Confidence Level in using Digital Tools and Technologies for Library Services

Confidence Level	Frequency	Percentage %
Not confidence at all	0	0.0%
Somewhat confident	1	2.9%
Moderately confident	18	52.9%
Very confident	11	32.4%
Completely confident	4	11.8%

Table 4 shows 85.3% of respondents are at least moderately confident about using digital tools and technologies for library services which shows a significant readiness in implementation of AI assistants in library services.

Table 5: Extent of Training Necessary for Chatbot use

Training Level	Frequency	Percentage%
None	0	0.0%
Basic (self-guided resources)	5	14.7%
Moderate (Instructor-led sessions)	12	35.3%
Extensive (Formal training)	14	41.2%
Not sure	3	8.8%

Table 5 shows 41.2% of respondents believe extensive training (formal sessions with assessments) is needed, while 35.3% are interested in moderate instructor-led sessions. Only 14.7% feel basic self-guided training is sufficient, showing a preference for extensive formal training and learning.

Table 6: Perceived impact of chatbot integration on user experience and the efficiency of library services

Ways chatbots enhance library services		
Enhancement	Frequency	Percentage%
Providing Instant answers to research queries	29	85.3%
Assisting with locating resources (e.g, books articles)	19	55.9%
Offering 24/7 access to library support	13	38.2%
Guiding through library databases and tools	8	23.5%
Helping with citation and reference management	19	55.9%

85.3% of respondents believe chatbots can enhance library services by providing instant answers to research queries, highlighting efficiency as a key benefit. 55.9% expect chatbots to assist with locating of resources and helping with citation and reference management. 38.2% 24/7 access to library support and 23.5% of respondents expect chatbots guide through library databases and tools.

Table 7: The primary expectations of librarians regarding the integration of chatbots into academic libraries.

Expectation	Frequency	Percentage
Efficiency in answering questions	10	29.4%
Availability 24/7 for support	21	61.8%
Providing accurate and reliable information	20	58.8%
Enhancing the overall user experience	17	50.0%
Supporting academic success through tailored assistance	23	67.6%
Streamlining research processes	14	41.2%
Offering real-time support for library users	23	67.6%
Providing multilingual assistance	12	35.3%
Helping with resource discovery	21	61.8%
Reducing wait times for user inquiries	21	61.8%

Table 7 shows 67.6 respondents indicated supporting academic success through tailored assistance and offering real-time support for library users are the highest ranked expectations. 61.8% of the responses demonstrates availability 2/7 support and helping with resource discovery. 58.8% indicated providing accurate and reliable information. 50.0% indictaed Enhancing the overall user experience (50.0%) and streamlining research processes (41.2%) highlight the desire for chatbots to improve library services beyond basic inquiries. Providing multilingual assistance (35.3%) is less emphasized, but still relevant for diverse user

communities. Efficiency in answering questions (29.4%) is ranked the lowest, possibly because it is assumed as a fundamental feature rather than a differentiating factor.

Discussion of Findings

The perceived challenges that library staff have regarding the introduction of chatbots in academic libraries.

Majority of librarian's major concern was about the accuracy and reliability of chatbot (55.9%), 41.2% of respondents expressed concerns on the impact on employment opportunities. 41.2% highlight fears that chatbots may replace human roles. Data privacy and security (32.4%) is another notable concern, indicating the need for strong security frameworks in chatbot implementation. Although there are speculations that chatbot technology will make librarians out-dated by rendering librarians jobless, Aminu etal. (2023) maintained that artificial intelligence will significantly improve library operations and service delivery and raise the relevance of libraries in a rapidly changing digital society. Additionally, like many novel technologies, artificial intelligence, is perceived as a threat to librarians and the human elements in libraries. Nevertheless, as artificial intelligence is eventually integrated into library services, it will certainly reveal its many potentials and promises for librarianship. According to Fatouh and Hamam, (2024) chatbots are one of artificial intelligence main application. It has become an essential instrument in our daily lives. Chatbots are designed to create an environment that fosters interactive dialogue between humans and machines. They answer questions through voice interfaces or text that mimic human cognition. Artificial intelligence is a concept that requires significant human effort to carry out complex tasks. Notwithstanding the advantages these chatbots provide, there are numerous issues and worries about their use, most notably bias in retrieval, security and data privacy. This aligns with the respondents concerns with 32.4% of the respondents expressing concerns with data privacy and security. Mukherjee & Kumar (2023) iterated that although chatbots could be very valuable tools for the library and information science profession, they cannot replace librarians, hence librarians should be ready to adopt these tools in their normal activities to serve library users with their personalized information needs.

Extent of librarians' familiarity with chatbots

Majority of librarians sampled (97.1%) had over ten (10) years of work experience. 73.5% of the respondents were at least moderately comfortable with using technology. 85.3% of respondents were at least confident in using digital tools and technologies for library services. Majority of librarians (91.7%) indicated their needs for trainings on the efficient use of chatbots. This shows that librarians are willing to adopt chatbot technologies to enhance library services although there are significant amount of concerns on chat bot adoption.

Perceived impact of chatbot integration on user experience and the efficiency of library services by librarians

Aboelmaged et.al., (2024) opinionated that there is no widely acknowledged definition of chatbots but it has been described in artificial intelligence and information science as intelligent

conversational applications that can stimulate natural language conversation by engaging in text or voice with humans. Aboelmaged etal., (2024) extracted several literatures from different authors on implications of chatbots on library services. It was gathered that chatbots provides 24/7 services that is consistent, enhances user engagement, and replaces complicated navigation systems. A robotic assistant was able to perform duties efficiently and socially interact with interact with individuals. Chatbots are likely to face implementation challenges such as technical know-how and efficiency. Some librarians have minimal familiarity with chatbots and robotics. Chatbots enhance user experience and provide valuable insights to librarians. Chatbots enhance the quality of services offered by academic libraries, but librarians must work with developers to address data privacy intrusion (ethical consideration such as bias ad privacy), need for user friendliness and examine communication errors. Reference services can be enhanced through virtual reference services. Users have the advantage to get more precise and customised answers to their queries. This in turn reduces workload on librarians. Robots are essential for effective service delivery in public library services.

The study found that librarians perceived chatbots can enhance library services by providing instant answers to research queries, highlighting efficiency as a key benefit. Respondents expect chatbots to assist with locating of resources and helping with citation and reference management. In addition, access to library support and expectation on chatbots to guide through library databases and tools.

The study also found the primary expectations of librarians regarding the integration of chatbots into academic libraries indicated supporting academic success through tailored assistance and offering real-time support for library users are the highest ranked expectations. 24/7 support and helping with resource discovery. Providing accurate and reliable information. Enhancing the overall user experience and streamlining research processes. The study highlighted the desire for chatbots to improve library services beyond basic inquiries. Providing multilingual assistance and efficiency in answering questions.

Primary expectations of librarians regarding the integration of chatbots into academic libraries

The study showed librarians were interested in using chatbot technologies to support patrons needs on activities such as finding quick answers to common questions, assisting with library catalogue searches, providing information about library hours and policies. Offering guidance on how to use online resources or databases, providing technical support for online library services, directing you to specific sections of the library and reserving study rooms or library equipment. This aligns with Fatouh & Hamam 2024:Aboelmaged etal., 2024 on librarians expectation on chatbot technologies.

Conclusion

Librarians need to consistently update their services and skills to keep up with the changing information industry and user needs. Incorporation of new technologies like chatbots are

necessary to improve efficiency and enhance library services. It has been proven that chatbots increase student's engagement with academic library services, which could boost library patronage. They also simplify the activities in the reference department by reducing ordinary inquiries and creating more time for library staff.

Although there are major concerns of data security and privacy, extreme measures need to be put in place to address data security challenges in the design of chatbots. On the accuracy and reliability of chatbots, working with experts on chatbot designs and having a coordinated system will greatly reduce the possibility of having inaccurate and unreliable information for users. Chatbots will not in any way reduce employment opportunities for librarians rather it simplifies their tasks and enable them save time on certain activities.

There is need for future research on developing chatbots peculiar to Nigeria's library system and testing models for implementation.

Recommendations

For improvement, the following recommendations are proffered:

1. There is a need for strategic planning, budget and funding to implement chatbots assistants in Nigerian libraries. Librarians should take advantage of the simplicity chatbots offer to their library activities. Librarians should not be afraid to embrace chatbot technology as it makes their tasks easier.
2. Ongoing training of librarians on latest technology advancement is required to continually update skills and services to keep up with the changing information industry and user requirements.
3. Librarians need to take advantage of the benefits chatbots offer by reducing workloads and meeting patron's needs 24/7.
4. Librarians need to work with experts such as computer scientists, software developers and data analysts to create a knowledge bank with information required in their libraries to analyze and develop chatbots that meet their required needs, this will guide against unreliable and inaccurate information the bot provides to library patrons. Librarians also need to engage cyber security experts to develop policies that protects the user's data against cyber-attacks. Librarians need to understand the peculiarity of the Nigerian library system in order to develop flexible bots that are compatible with mobile and desktop devices to meet the specific needs of the Nigerian library system.

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