Investigating the Impact of Generative AI Tools on Research: A Case Study

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Abstract

The purpose of this study is to investigate perceptions and experiences regarding the utilization of Artificial Intelligence (AI) tools in scholarly research at Cooch Behar Panchanan Barma University, West Bengal. In addition, the study seeks to propose a model for librarians to enhance researchers' awareness of the optimal use of AI tools within library settings. Data for the study were collected through an online questionnaire (Google form) administered to faculty members and research scholars at the university campus. The study revealed that 100% of the respondents prefer to utilize various AI tools in their research, citing their prompt assistance in research endeavours. A substantial number of respondents demonstrated a high level of awareness and positive attitudes toward integrating AI tools in research. However, they acknowledged ethical considerations regarding the utilization of AI tools as a critical issue in the research domain.

Keywords: Artificial Intelligence; Generative AI Tools; Scholarly Research; Cooch Behar Panchanan Barma University; West Bengal

1. Introduction

The modern world has been significantly impacted by Information and Communication Technology (ICT) in various manner, which have changed the way we work, communicate, access information, and engage with one another. The growth of online learning platforms, together with many tools and approaches, has significantly transformed education. AI tools have become important in every aspect especially in academic research, revolutionizing how scholars collect, analyse, and interpret data across diverse fields (Fitria, 2021). From natural language processing aiding literature reviews to machine learning algorithms facilitating data analysis and pattern recognition, AI streamlines research processes and uncovers insights that were previously inaccessible. AI-driven tools assist in experimental design, automate repetitive tasks, and enhance collaboration through platforms for shared data and resources (Salido, 2023). Moreover, AI enables researchers to tackle complex problems at a scale, from drug discovery in biomedicine to climate modelling in environmental science. Undoubtedly, various AI tools play a significant role in research, offering promise in enhancing user experience, improving efficiency, and streamlining data management, analysis and referencing. However,

the present study aims to examine perceptions and experiences regarding the use of AI tools in scholarly research among faculty members and research scholars at Cooch Behar Panchanan Barma University (CBPBU).

CBPBU is a well-known institution situated in the historical city of Coochbehar, West Bengal, India. Named after the eminent social reformer and philosopher of Coochbehar, Thakur Panchanan Barma. CBPBU was established in the northern region of West Bengal in 2012. The university offers a diverse range of undergraduate, postgraduate, PhD, and certificate programs across various disciplines including Science, Social Science and Humanties, etc. Keeping pace with the contemporary era, CBPBU has emerged as a beacon of educational advancement in North Bengal, inspiring students to pursue research beyond their higher education.

2. Objectives of the Study

The fundamental aim of this study was to explore perceptions and experiences regarding the use of AI tools in scholarly research. To accomplish this, specific objectives have been designed as follows:

❖ To identify the specific AI tools commonly used by researchers in their research endeavours;

❖ To assess the awareness levels of researchers at CBPBU regarding various AI tools utilized in academic research;

❖ To know researchers' attitudes toward the integration of AI tools and their perceived impact on academic research practices;

❖ To investigate ethical considerations and awareness related to the utilization of AI tools in research;

❖ To propose a model aimed at enhancing researchers' awareness of the optimal utilization of AI tools to improve the effectiveness of their research within library settings.

3. Literature Review

According to Rathinasabapathy et al. (2023), AI has revolutionized the mindset of scientific research. By connecting AI capabilities, research scholars and scientists can refine their research processes, enhance data analysis and visualization, and accelerate the rate of discoveries. Kooli (2023) highlighted the significant advantages of AI systems and chatbots within academia, indicating a probable rise in their utilization in the foreseeable future. Further, the author also emphasized the crucial necessity for researchers and educators to conduct thorough assessments of both the ethical and technical consequences associated with AI systems. Edro et al. (2019) highlighted the benefits associated with incorporating AI into the realm of education and research. The researchers acknowledged that AI integration in education holds the capacity to automate mundane tasks, thereby liberating time for addressing more intricate matters.

Al-Zaharin (2023) delved into the impact of AI tools on Higher Education, particularly focusing on researchers and research in Saudi Arabia. The study revealed that participating students exhibited a remarkable level of awareness regarding GenAI research, showcasing a keen understanding of its potential to revolutionize

academic research. A study conducted by Khanagar et al. (2021) explored how dental students in Riyadh perceive and engage with AI within their educational context. The findings revealed that approximately 50.1% of respondents lacked knowledge about the working principles of AI, and 55.8% were unaware of its various applications. Despite the observed low levels of AI knowledge among dental students, there was significant enthusiasm among them to learn and utilize AI technology. Ajani et al. (2022, 226p.) revealed a positive opinion from the working librarians in Nigeria.

The general perceptions of librarians on the integration of AI systems are somewhat positive and its application in library operations and services can take the library to the next level by reducing human errors due to the repetitiveness in the library operations and services.

Many scholars have identified ethical considerations and academic integrity as significant challenges when utilizing AI tools for research in higher education (Eke, 2023). Al-Zahrani (2023) highlighted that the key challenge is recognizing between writing generated by machines and by human beings is one of the important factors to concern. According to Tzirides et al. (2023), AI systems have the potential to imperil knowledge work, particularly in the core fields including information sources, claimed fact accuracy, theoretical validity, the existence of clear ethical frameworks, and critical discourse quality. Notably, Eke (2023) highlighted that the collaborative initiatives including institutions and various stakeholders, such as AI developers, policy-makers, publishers, academics, and students, are necessary to minimize the threats to academic integrity and optimize the advantages. Khan and Fadziso (2020) discovered that the majority of respondents believe that ethical considerations are essential for machine and automation design, and there is a need to enhance the relationship between machines and humans.

4. Methodology

The study's target population consisted of faculty members and research scholars at CBPBU. Postgraduate and undergraduate students were excluded as they are not typically engaged in regular research activities. CBPBU comprises 18 departments, with a total of 61 faculty members occupying various positions (Assistant Professor, Associate Professor, and Professor). In addition, there are 145 research scholars currently pursuing their research under the supervision of these faculty members. The study employed an online questionnaire (Google Form) to gather pertinent data from faculty members and research scholars on the university campus. The questionnaire was designed based on the previous studies. The questionnaire comprised both open-ended and closed-ended questions, totalling 11 items aimed to achieve the study's five objectives. Pilot testing was also conducted with 10 respondents, consisting of 5 Assistant Professors, 2 Associate Professors, and 3 Research Scholars from various departments, to validate the questionnaire. Feedback was received and incorporated into modifications accordingly.

The final web link to the online questionnaire was circulated exclusively to research scholars via WhatsApp and email. Notably, faculty members were personally approached at their departments. They were briefed about the study's objectives, and verbal permission was obtained. One of the researchers visited the

faculties and facilitated the completion of the online questionnaire in April 2024. Out of 61 faculty members, 38 (62.2%) responded positively, while out of 145 research scholars, 34 (23.4%) responded. The researchers aimed to include all faculty members and their scholars; however, a total of 72 (34.9%) complete responses were received in the end (including those who had participated in the pilot testing of the data collection instrument). Notably, during this period, some faculty members were on leave, and several scholars were irregular in attending their departments. Despite being sent the link, a majority of them did not respond. The data was analysed by using statistical software namely SPSS (Version 25).

5. Results

5.1 Demographic Profile

Table 1 presents the demographic profile of the respondents. The majority of respondents (n=46, 63.9%) identify as male. Out of 72 participants, 34 (47.2%) are research scholars, 18 (25.0%) hold the position of Assistant Professor, and 4 (5.6%) are designated as Professors. Notably, the largest proportion of respondents (n=31, 43.1%) belong to the 25 to 30 age group, followed by 21 (29.2%) falling within the 31 to 40 age bracket. Moreover, it was observed that the highest level of educational attainment among respondents is a Ph.D., followed by a master's degree with NET/JRF qualification.

Table 1: Demographic Profile of the Respondents

Demographic variables		No. of respondents (n=72)	Percentage
Gender	Male	46	63.9
	Female	26	36.1
Age	25-30 years	31	43.1
	31-40 Years	18	25.0
	40-50 years	21	29.2
	50-65 years	2	2.8
Highest Qualification	Master Degree with NET/JRF	33	45.8
	Ph.D.	35	48.6
	Others	4	5.6
Academic Position	Research Scholar	34	47.2
	Assistant Professor	18	25.0
	Associate Professor	16	22.2
	Professor	4	5.6

5.2 Purpose of using AI Tools

AI tools have become the latest craze in the realm of scholarly writing. However, the researchers asked the respondents about their purposes for using AI tools. As depicted in Figure 1, the majority of respondents

(n=53, 73.6%) indicated that they use AI tools for text generation or summarization purposes. Over fifty percent of respondents use AI for research design, followed by generating new ideas, etc. Notably, many respondents reported utilizing AI tools for various other purposes, including proofreading, content modification, paraphrasing, referencing, text mining, data mining, etc.
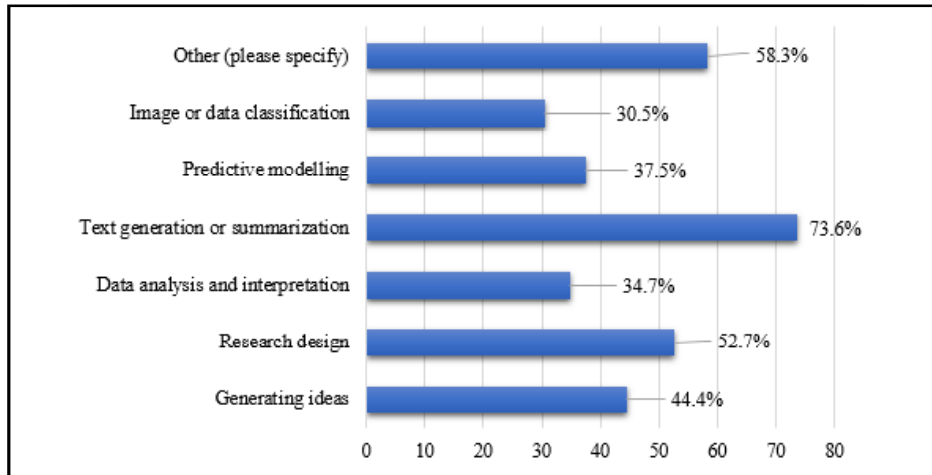

Figure 1: Purpose of using AI tools among the Respondents

5.3 Preferred AI Tools

It's well-known that numerous AI tools are commonly utilized in research. However, compiling an exhaustive list of AI tools specifically tailored for research purposes proved challenging. Nevertheless, the researchers included some of the most prevalent AI tools in their questionnaire. Figure 2 illustrates that 100% of the respondents favour ChatGPT, attributing its quick assistance to their research endeavours. Moreover, 91.6% (N=66) of the respondents express a preference for Sci-Space. Interestingly, over 80% of participants utilize Quillbot for paraphrasing and grammatical correction. In addition, many respondents reported regular use of other AI tools such as Elicit, Rytr, Jasper, Bing AI, Mendeley, Paperpal, Inciteful, Paper Brain, etc.
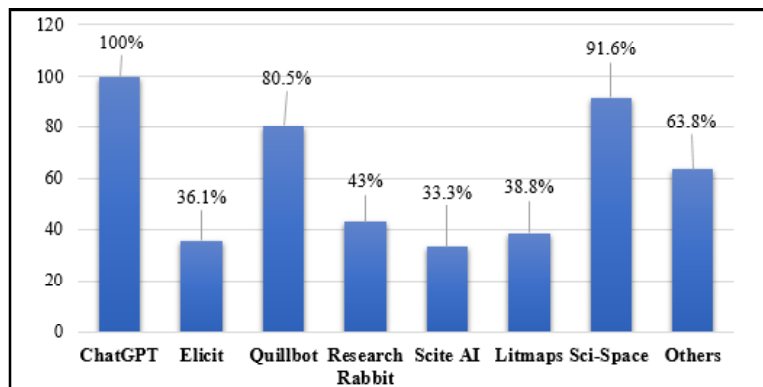

Figure 2: Most preferred AI tools among the respondents

5.4 Reason behind using AI tools in Research

The researchers sought to find out the reason behind the use of AI tools in their scholarly research. As shown in Figure 3, the majority (n=67, 93%) of respondents indicated that they utilize AI tools primarily to enhance language editing, while over 90% noted that these tools contribute to improving the quality of writing. Notably, more than sixty percent of respondents reported using AI tools to identify relevant research areas, generate research ideas and materials, and enhance the quality of analysis. However, many respondents utilize AI tools for various purposes such as exploring new opportunities in data analysis, discovering new knowledge, addressing problems, and swiftly producing data samples for research across multiple domains.
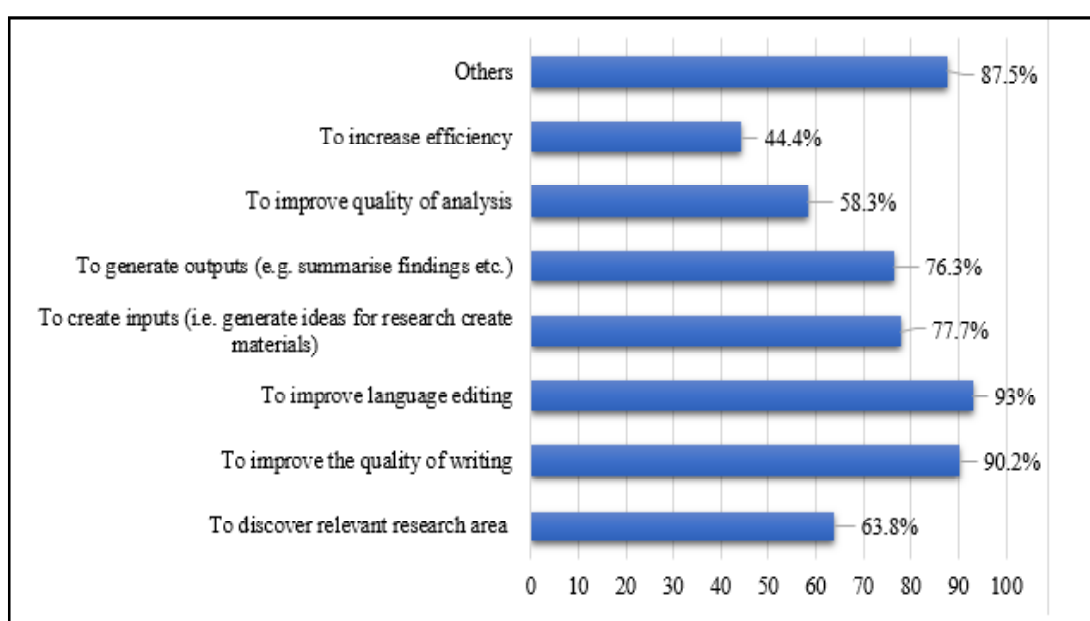

Figure 3: Reason behind the utilization of AI tools in Research

5.5 Awareness level of Respondents

Table 2 presents the average agreement levels, measured by mean and standard deviation (SD), for ten distinct statements assessed by respondents using a five-point scale ranging from strongly disagree (1) to strongly agree (5). Mean scores reflect the average agreement level with each statement, with higher scores indicating greater positivity. Standard deviation (SD) gauges the extent of variability in responses, with larger values indicating more significant variation in ratings.

The survey results demonstrate a resounding consensus among respondents regarding the transformative potential of AI in academic research. With mean scores of 4.39, both the assertion that AI enhances research quality and the belief that it revolutionizes the research process garnered the highest acclaim, showcasing strong agreement with the notion that AI tools are reshaping academic research paradigms.

Table 2: Level of awareness regarding different AI tools utilize in Research

S. No.	Items	Mean	SD
1.	I enjoy experimenting with AI tools to be how it could benefit my research	4.06	.767
2.	I understand how to use AI effectively in my research	4.06	.669
3.	I encourage my co-researchers to try using AI tools for their research	4.06	.902
4.	Having access to AI tools will change how I do research	3.18	1.167
5.	I am excited about the prospects of AI for academic research	4.17	.712
6.	Using AI for research will improve the quality of work	4.39	.832
7.	Now-a-days AI is an essential part of the research journey	4.21	.871
8.	AI will revolutionise how academic research is conducted	4.39	.832

However, a significant number of respondents strongly agree with statements such as "AI is now an indispensable component of the research journey" (mean score of 4.21), "the potential of AI for academic research is promising" (mean score of 4.17), "I understand how to use AI effectively in my research" (mean score of 4.06), etc. This indicates their substantial awareness of the effectiveness and utility of AI tools in research.

5.6 Attitudes toward the integration of AI Tools

As shown in Table 3, assessed by mean and SD, for seven distinct statements rated by respondents using a five-point scale from strongly disagree (1) to strongly agree (5). The study found a positive attitude toward the integration of AI tools in research activities.

The statement regarding "searching for and mapping literature reviews" using AI tools received the highest mean score (4.33), indicating a strong confidence that these tools facilitate efficient searching and gathering of relevant literature from various databases. AI tools were perceived favourably in terms of "enhancing data analysis and visualization", garnering a mean score of 4.31. This suggests that respondents can analyse and present their data in various formats with the aid of these tools.

The functionality of AI tools in "constructing grammatically correct sentences" received a mean score of 4.29, indicating that respondents utilized these tools for copy editing, proofreading, and improving sentence structures to eliminate grammatical errors. The integration of AI was perceived positively in "facilitating the development of research proposals" for researchers (mean score of 4.15), suggesting that respondents used these tools to enhance the systematic and scientific presentation of their proposals.

Table 3: Attitudes toward the integration of AI tools in Research

S. No.	Items	Mean	SD
1.	AI integration can facilitate the development of research proposals for researchers	4.15	.664
2.	AI tools aid in searching for and mapping literature review	4.33	.692
3.	AI tools assist in constructing sentences free from grammatical errors	4.29	.941
4.	AI tools assist in generating appropriate citations and references	4.11	1.082
5.	AI tools enhance data analysis and visualization	4.31	.744
6.	AI tools reduce workload and save time	3.97	.691
7.	AI integration has the potential to positively impact the accessibility and inclusivity of academic research outcomes	3.99	.864

The feature of AI tools aiding in generating appropriate citations and references was also well-received (mean score of 4.11), reflecting positive perceptions among respondents that they utilized these tools to seamlessly incorporate in-text citations and references without errors or hassle. Moreover, respondents showed a positive response toward the enhancement of data analysis and visualization through AI tools and they also believed that these tools reduce workload and save their time.

5.7 Ethical Considerations

As shown in Table 4, the majority of respondents demonstrated a good awareness of ethical considerations associated with the use of AI tools in research. The statement "I believe there should be transparency and accountability in AI systems used for research, advocating for ethical practices" received the highest mean score of 4.37, indicating that respondents possess a profound understanding and endorse the importance of transparency and accountability in AI-generated content and its application.

Table 4: Ethical considerations and awareness related to the utilization of AI

S. No.	Ethical Considerations and Concerns	Mean	SD
1.	I am aware of ethical guidelines or policies regarding the use of AI-generative tools in research	3.88	.749
2.	I believe there should be transparency and accountability in AI systems used for research, advocating for ethical practices	4.37	.795
3.	I believe in my capacity to identify and address potential biases inherent in AI algorithms utilized within research contexts	3.96	.759
4.	I believe ethical considerations should be a primary concern when using AI-generative tools in research.	4.32	.766
5.	I believe in my ability to explore and navigate the complex ethical landscape surrounding the integration of AI tools in research	4.04	.740
6.	I believe researchers should actively discuss and address the potential biases of AI tools	4.03	.750

Similarly, another statement, "I believe ethical considerations should be a primary concern when using AI-generative tools in research," received a mean score of 4.32, suggesting that respondents are well-versed in the utilization of AI-generative tools in research and prioritize ethical considerations accordingly. Notably, the overall result highlights that the respondents have good understanding and awareness of the ethical implications of the use of AI tools in scholarly research.

6. Proposed Model to Improve the Awareness within Library Settings

According to Hussain (2023, p. 15), "Librarians are change agents of modern and advanced technologies and have long been responding to current technologies that improve their services". The role of librarians has undergone a significant transformation in the modern era. They now serve as information resources, assisting researchers in conducting smooth studies and providing instant support with the help of modern technologies. Rathinasabapathy et al. (2023) emphasized that despite the promising potential of AI tools to revolutionize academic research, many academics struggle with leveraging these tools effectively due to a lack of expertise. "They underscored the crucial role of librarians in raising awareness among users, including students, research scholars, faculty, and scientists, regarding the efficient utilization of AI tools to bolster their academic and research endeavours" (p. 172). Notably, the study suggested some areas where librarians can assist researchers to use AI tools effectively (Figure 4).
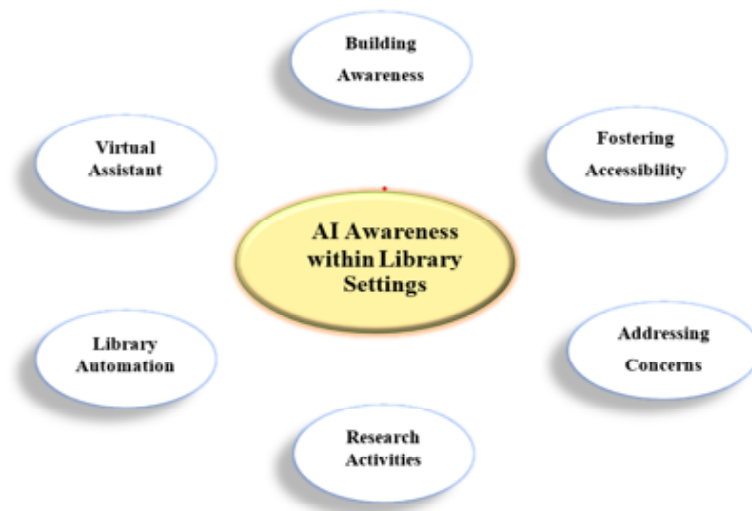

Figure 4: A Proposed Model to Improve the Awareness within Library Settings

6.1 Building Awareness

❖ **Workshops and training sessions:** Librarians can organize workshops and orientation programs for all stakeholders to familiarize them with various AI tools.

❖ **Partnerships:** Librarians can collaborate with AI experts to arrange demonstrations showcasing the potential of AI in research and learning.

6.2 Fostering Accessibility

❖ **Curated resources:** Librarians can develop a dedicated library section or online repository comprising various forms of resources.

❖ **Multilingual support:** Librarians can ensure the researchers that information about AI tools is available in multiple languages to cater to the diverse needs of library users.

6.3 Addressing Concerns and Building Trust

❖ **Ethical considerations:** Librarians can also host talks or workshops to examine the ethical dimensions of AI, including discussions on data bias and responsible usage.

❖ **Privacy assurances:** Clearly articulate the library's data privacy policies regarding user interactions with AI tools, reassuring researchers of their privacy rights and protections.

6.4 Assisting in Research Activities

❖ **Mapping literature search:** Librarians can aid research scholars in conducting literature reviews through the use of AI tools for effective, systematic literature searchers.

❖ **Data analysis and visualization:** Librarians can educate scholars on how AI tools facilitate data visualization, including techniques such as image visualization, personalized visualization, and data augmentation.

❖ **Plagiarism, grammatical checker and reference management:** One of the most crucial services provided by librarians to research scholars involves plagiarism checks using AI tools. Besides, they can support researchers for their grammatical improvement, reference management by employing AI tools.

6.5 Other Areas of Implementation

❖ **Virtual assistance and chatbots** is an AI-driven Chatbot that can provide instant support to library patrons by answering research inquiries and directing them to pertinent resources.

❖ **The facilitation of Library Automation** is made easier by the implications of Artificial Intelligence tools, like applications of AI tools in Cataloguing.

7. Conclusion and Recommendations

Recent developments such as natural language processing, machine learning, and chatbots are increasingly gaining recognition as libraries acknowledge the potential benefits of AI. Effective collaboration and sharing of knowledge will continue to be crucial in addressing challenges associated with the integration of AI. However, the study revealed that 100 percent of the respondents prefer to use ChatGPT followed by other popular AI tools like Sci-Space, Elicit, Paper Brain, Quillbot, Bing AI, Grammarly, Mendeley, Jenni, etc. The

study found that most respondents utilize AI tools for various purposes such as generating new ideas, language editing, paraphrasing, referencing, content modification, text mining, etc. Some of the researchers also use these tools for designing research proposals. Important findings come from this study that the majority of respondents were well aware of the utilities of various AI tools in the research domain. They reported a positive attitude towards utilizing these tools in research activities starting from designing research proposals to reference management. Further, the majority of respondents also reported that AI tools alleviate workload and save time, functioning as an instant support system for researchers. When utilizing AI tools in research, ethical considerations appear as significant issues. The study revealed that most of the respondents were well aware of the ethical implications linked to the appropriate use of these tools.

Based on this study, it is suggested that all university libraries can introduce the application of AI tools in their day-to-day library operations. Besides all these, university libraries can provide training for their staff, researchers and students to ensure proper guidance and utilization of these tools. To enhance the quality of library services, they can fully implement AI technology such as chatbots, barcodes, RFIDs, and robotics. Moreover, libraries can capitalize on the opportunity presented by AI to establish new connections with remote patrons, thereby regaining significance among the user population, including researchers. Significantly, the findings provide a valuable insight in academics, educators, and policymakers. From these results, university libraries can acquire access to premium versions of AI tools, provide orientation and instant support, facilitate access to data, promote ethical use, and stay updated on AI trends.

References

1. Ajani, Y. A., Tella, A., Salawu, K. Y., & Abdullahi, F. (2022). Perspectives of librarians on awareness and readiness of academic libraries to integrate artificial intelligence for library operations and services in Nigeria. Internet Reference Services Quarterly, 26(4), 213-230.

2. Al-Zahrani, A. M. (2023). The impact of generative AI tools on researchers and research: Implications for academia in higher education. Innovations in Education and Teaching International, 1-15.

3. Eke, D. O. (2023). ChatGPT and the rise of GenAI: Threat to academic integrity? Journal of Responsible Technology, 13, 100060. https://doi.org/10.1016/j.jrt.2023.100060

4. Fitria, T. N. (2021). Artificial intelligence (AI) in education: Using AI tools for teaching and learning process. In Proceeding Seminar Nasional STIE AAS (pp. 134-147). Available at: file:///C:/Users/munsh/Downloads/Fitria.pdf

5. Hussain, A. (2023). Use of artificial intelligence in the library services: prospects and challenges. Library Hi Tech News, 40(2), 15-17.

6. Khan, W., & Fadziso, T. (2020). Ethical Issues on Utilization of AI, Robotics and Automation Technologies. Asian Journal of Humanity, Art and Literature, 7(2), 79-90.

7. Khanagar, S., Alkathiri, M., Alhamlan, R., Alyami, K., Alhejazi, M., & Alghamdi, A. (2021). Knowledge, attitudes, and perceptions of dental students towards artificial intelligence in Riyadh, Saudi Arabia. Med Sci, 25(114), 1857-1867.

8. Kooli, C. (2023). Chatbots in education and research: A critical examination of ethical implications and solutions. Sustainability, 15(7), 5614.

9. Rathinasabapathy, G., Swetha, R., & Veeranjaneyulu, K. (2023). Emerging artificial intelligence tools useful for researchers, scientists and librarians. Indian Journal of Information Library & Society, 36(3-4), 163-172.

10. Salido, V. (2023). Impact of AI-Powered Learning Tools on Student Understanding and Academic Performance. Available at: 10.13140/RG.2.2.17259.31521

11. Tzirides, A. O., Saini, A., Zapata, G. C., Searsmith, D., Cope, B., Kalantzis, M., Castro, V., Kourkoulou, T., Jones, J., Abrantes da Silva, R., Whiting, J., & Kastania, N. P. (2023). GenAI: Implications and applications for education. ArXiv, abs/2305.07605. https://doi.org/10.48550/arXiv.2305.07605

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