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Artificial Intelligence Tools For Academic Research: A Critical Examination Among Library And Information Science Scholars

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ABSTRACT

AI research tools have become increasingly well-known in advancing academic and industry research, driven by the rapid rise of artificial intelligence technologies. As AI progresses, with innovations such as sophisticated machine learning algorithms and natural language processing models, its role in research is expanding and beginning to transform traditional research practices in many areas. The current study aimed to identify the frequency of use/access, time spent, primary purpose, the favorite AI tool, and its ranking among the library and information science scholars in different universities in Tamil Nadu. Also, to know the advantages, challenges, and various limitations of using AI Tools in the research. They were administered to a sample of 132 library and information science scholars from different universities in Tamil Nadu. A purposive sampling technique was adopted for the study. The researchers primarily omitted ChatGPT from this list. Because everyone knows and is familiar with it. The study concluded that there is a great awareness of various artificial intelligence tools and their use. Also found that Library and Information Science Scholars use AI tools for literature reviews, enhanced research quality, and accelerated data analysis in their research. Also, they agreed that the Semantic Scholar AI tool is

primarily used for literature review and management, and the Quilbot AI tool is used for detecting AI-generated content, Paraphrasing, and checking grammar. A significant relationship was found between awareness of the artificial intelligence tool, ranking, advantages, and challenges of AI tools and LIS Scholars. All respondents agreed with the researcher's opinion that "AI tools might not cover all relevant sources, especially niche or emerging research areas. Supplement researcher". The current study recommended subscribing to some AI tools for research and suggested how to make fair use of AI tools for the research.

Introduction

Technology integration has played a major role in changing the academic landscape in recent years. Artificial intelligence (AI) is one of the most revolutionary technological developments, especially in natural language processing (NLP). AI's capacity to comprehend, interpret, and produce human language has created new opportunities to improve academic research and instruction. The expanding fields of AI and NLP services, as well as their uses in academia, are examined in this article. Academic researchers, instructors, and students are continuously looking for tools and resources to enhance and facilitate the acquisition and sharing of knowledge. AI has created numerous tools for scientific writing, editing, content analysis, and literature searches in the academic sector. In addition to streamlining academic procedures, using these instruments promises to enhance the breadth and depth of academic research. But immense responsibility also comes with great possibility. There are ethical issues and difficulties associated with integrating AI in academics. Bias, potential, privacy, and authenticity are crucial. To ensure that AI does not replace researchers but enhances them, researchers should also distinguish between AI tools and their expertise, research, writing style, and inventiveness.

Scientific studies in many fields are fast changing due to artificial intelligence (AI). AI-powered solutions improve the effectiveness, precision, and speed of data analysis, interpretation, and hypothesis development in biology and physics fields. These AI tools may completely transform the trials and research conducted by social scientists. An artificial intelligence (AI) research tool uses AI to help researchers with different parts of their work. These technologies help speed research, improve literature

reviews, produce insights, and automate data analysis. AI research tools make it possible to efficiently explore large datasets and find patterns by combining sophisticated algorithms and machine learning models. They promote collaboration across several sectors, increase accuracy, and speed up discovery. By increasing productivity and creativity, AI research tools enable academics to concentrate on more intricate and imaginative facets of their job.

Review of Literature

Alam (2021) Another benefit for scientists is that AI can make collaboration easier. AI can help with team communication as well as task and project coordination. Additionally, AI can be used to automate document review and exchange, which facilitates academic collaboration on projects. Additionally, AI might be used to connect scholars with the resources they need to complete their job, making it easier for them to find and access the data they need to conclude their research. Furthermore, the use of AI in academic research can help generate new ideas and perspectives. Furthermore, AI has the potential to generate new theories and concepts as well as new patterns in data. Scholars may gain new insights from this and be able to carry out their research with greater understanding.

As AI becomes increasingly common in educational technology, Cardona et al. (2023) they stress the necessity of moral and just regulations. According to the research, artificial intelligence (AI) can help with educational priorities like improving teaching positions and making learning materials more adaptive, but it also poses new hazards like increasing surveillance and the possibility of discrimination due to algorithmic prejudice. In order to ensure that AI systems used in education are safe, efficient, and scalable, it urges educational leaders to participate in the creation of policies.

Chassagne, 2018 Even while AI has many clear benefits for academics, there may be disadvantages when using it for collaboration and research. One possible disadvantage of AI is the possibility of data tampering or erroneous results. Another potential disadvantage is the potential for AI to be used to circumvent ethical dilemmas during research. Additionally, it's possible that AI may be used to automate human-required chores like proofreading and peer review.

Chatterjee and Bhattacharjee (2020) conducted a quantitative study using structural equation modeling to explore the adoption of artificial intelligence in higher education. Their research advances our knowledge of artificial intelligence adoption in higher education, which is consistent with the goal of the quantitative study outlined in this assignment. Institutional policies and procedures for the successful

adoption of AI that proactively address the needs and concerns of academics across disciplines can be informed by the findings. To ensure ethical and sustainable practices that improve pedagogical and research excellence, integrating AI in academia necessitates a data-driven understanding of stakeholders' perspectives.

The acceptance, perception, and learning impact of ChatGPT in higher education were investigated by Dwivedi et al. (2023), underscoring the tool's diverse use in educational environments. Their research shows that although ChatGPT is well known for its ability to improve educational experiences, worries regarding how it may affect student work authenticity and academic integrity continue. This emphasizes the need for more investigation into the wider ramifications for teaching and learning of integrating AI tools like ChatGPT into educational processes.

Holmes et al. (2021) contend that an ethical framework for AI is essential and that the majority of AI researchers lack the training necessary to handle new ethical concerns. Prunkl et al. (2021) recommend that authors publish a statement outlining the research's wider societal ramifications.

In his discussion on the use of ethics standards as a governance tool in the creation and usage of AI, Larsson (2020) underlined the need for multidisciplinary research to succeed with data-dependent AI and the need for AI governance to shift from principles to processes. These contributions imply that a multidisciplinary strategy and a strong set of rules are necessary to guarantee the ethical application of AI in scholarly research. When paper mills create and disseminate phony or fraudulent papers, science journals encounter issues. These articles frequently include content, information, and photos that are either entirely or partially copied or made up, frequently as a result of ghostwriting. Such papers are likely to alter systematic reviews, mislead readers, and pollute the scientific literature. This worry has increased with the introduction of AI tools like ChatGPT. Additionally, because it takes a lot of work to identify and remove bogus publications, paper mills put a drain on journals' time and resources (Barnett, 2023; Brainard, 2023; Liverpool, 2023).

Teachers' opinions of an AI-enhanced scaffolding system designed to assist students with scientific writing for STEM education were examined by Kim & Kim (2022). According to the study, AI was viewed favorably by the majority of STEM teachers as a source of excellent scaffolding. However, they also brought up certain concerns about the use of AI in the classroom, like how the role of instructors would change and how transparent the AI system's decision-making would be. According

to this study, younger educators who have had more experience with educational technology are more eager to learn about and maybe integrate new digital tools into their lesson plans.

Objective of the Study:

- To identify the frequency of use/log/access to the AI tool website and time spent using AI tools for research among the respondents.
- To study the Purpose of using an AI tool for research, the favourite AI tool, and its ranking among the respondents.
- To examine the use of awareness of AI tools and their primary purpose in research among LIS Scholars.
- To know the Advantages and challenges of Using AI Tools in Research among the respondents.
- To extract opinions about various limitations of AI tools for research among the Library and Information Science Scholars.

Methodology

A structured questionnaire was designed to collect the original data from the selected population online. The present study has library and information science scholars doing Doctor of Philosophy in Library Science at various universities in Tamilnadu State. Using a purposive sampling technique, the survey method was chosen to gather the data. A pre-structured questionnaire was drafted and distributed among 150 LIS scholars of different universities, which received 88% (132) of the responses. The data was analyzed by drawing percentages to reveal findings.

Data Analysis and Interpretation

The analysis and interpretation of the data collected through the questionnaires distributed to the Library and Information Science Scholars of various universities in Tamilnadu are given below.

The Demographic characteristics of the population

Demographics of Respondents (N=132)		No. of respondents	Percentage
Gender	Male	73	55.30
	Female	59	44.70

Age Group	Below 30	28	21.21
	31-40	55	41.67
	41-50	30	22.73
	Above 50	19	14.39
LIS Scholar Status	Part-Time Scholars	90	68.19
	Full Time Scholars	42	31.81

Table 1: The Demographic characteristics of the population

The demographic details of the respondents are displayed in the data summary in Table 1. The data indicates that just 44.7% of respondents are female, whereas 55.3% of respondents are male. Of the respondents, 42.7% are between the ages of 31 and 40, and 22.7% are between the ages of 41 and 50. Just 14.4% of those surveyed are younger than 50. Additionally, the chart reveals that 42 (31.8%) of respondents are full-time scholars and 68.1% of respondents are part-time scholars. The figure makes it clear that the majority of respondents—more than 63%—are part-time students and fall within the age range of less than 40.

How frequently do the scholars use/log/access the AI tool website?

Frequency	No. of respondents	Percentage
Daily	94	71.21
Once in three days	25	18.94
Once in a week	13	9.85
Rarely	-	

Table 2: Frequency of use/log/access the AI tool website

Table 2 shows the frequency of users using AI tools for research-related activities. It can be seen from the table that 71.2% of respondents use AI tools for research every day. Only 18.9% of users use AI tools for research once every three days, and only 9.8% of respondents use AI tools for research once a week—no Respondents for rarely, which means using AI tools research is the basic thing in education

and research nowadays. The data shows that Library and Information Science Scholars frequently use AI tools for research-related activities.

How much time do LIS scholars spend using AI tools for research?

Time Spent Using the AI Tool	No. of respondents	Percentage
Less than 1 hour per day	13	9.89
2-3 hours in a day	94	71.21
4-5 hours in a day	21	15.91
Above 5 hours in a day	4	3.03

Table 3: Time Spent to use AI tools for research

The amount of time respondents spent using AI technologies for the study is displayed in Table 3. 15.9% of respondents reported using AI tools for 4–5 hours a day, compared to 71.2% who reported using them for 2–3 hours. Only 3% of those surveyed said they spent more than five hours daily. Table 5 shows that a more significant proportion of respondents—more than 90%—use the Internet for more than two hours every day. This demonstrates the respondents' growing reliance on AI resources for learning and research.

The Purpose of Using AI Tools for the Research

Because AI technologies can examine large datasets and spot intricate patterns, they have enormous potential for use in academic research. In addition to automating time-consuming processes like data entry, these technologies can help generate fresh research questions and hypotheses and search mountains of academic literature for pertinent information.

The purpose of using an AI tool for research	No. of respondents	Percentage
Supercharged literature reviews	132	100
Accelerated data analysis	117	88.67
Enhanced research quality	99	76.51
Automation of repetitive tasks	87	65.91
Predictive modeling and forecasting	75	56.81

Cross-disciplinary collaboration	61	46.21

Table 4: Purpose of using an AI tool for research

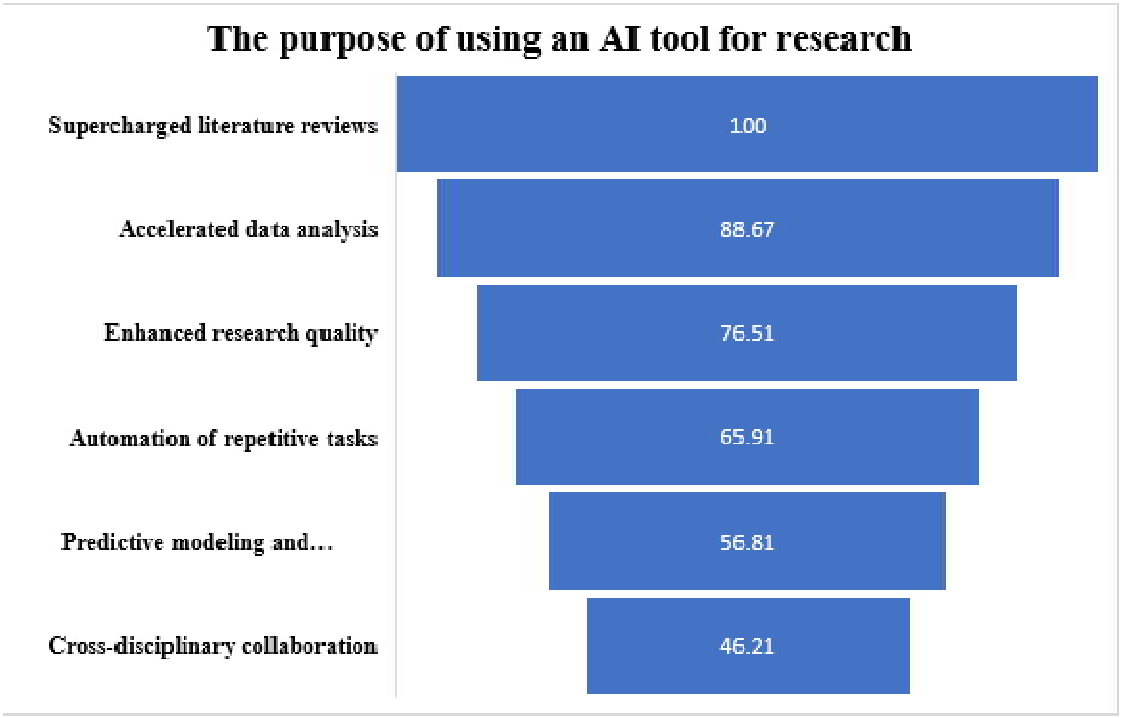

Figure 1 - Purpose of using an AI tool for research (Percentage)

Table 4 shows the purpose of using an AI tool for research. It can be seen from the table that 100% of respondents use AI tools for supercharged literature reviews. This was followed by 88.6% of respondents accelerating data analysis and 76.5% enhancing research quality, 65.9% of respondents using AI tools to automate repetitive tasks, 56.8% of respondents for predictive modeling and forecasting in research. Only 46% of users opted for cross-disciplinary collaboration. The data shows that the maximum respondents (70%) were Library and Information Science Scholars using AI tools for literature reviews, enhanced research quality, and accelerated data analysis in their research.

Awareness about AI tools and primary purpose in research

AI Tool	Primary Purpose among the respondents	No. of respondents	Percentage
HyperWrite	Hypothesis generation	101	76.51
Semantic	Literature review and management	132	100.00

Scholar			
Elicit	Summarizing papers	108	81.81
Maestra	Transcribing interviews	91	68.94
ATLAS.ti	Qualitative data analysis	89	67.42
Power BI	Quantitative data analysis	111	84.10
Paperpal	Writing research papers	68	51.51
Scribbr	Proofreading	79	59.85
Quillbot	Detecting AI-generated content/Paraphrase/Grammar Check	132	100.00
Lateral	Organizing documents	47	35.61

Table 5: Awareness of AI tools and primary purpose in research

Table 5 shows that all the LIS scholars know Semantic Scholar and Quilbot AI tools (100%). Also, they agreed that the Semantic Scholar AI tool is primarily used for literature review and management, and the Quilbot AI tool is used for detecting AI-generated content, Paraphrasing, and checking grammar. Followed by Power BI (84.1%) for quantitative data analysis, Elicit (81.8%) for summarizing papers, HyperWrite (76.5%) tool for Hypothesis generation, Maestra (68.9%) for Transcribing interviews, and ATLAS.ti (67.4%) tool for qualitative data analysis. Apart from that, the Scribbr (59.8%) AI tool is used for proofreading, and the Paperpal (51.5%) tool is used for writing research papers. Only 35.6% of LIS scholars know about the Lateral AI tool and its use for organizing documents.

Favourite AI tool and its ranking

Favourite AI Tool	**No. of respondents**	**Percentage**	**Ranking**
HyperWrite	99	75	6
Semantic Scholar	132	100	1
Elicit	103	78.03	4
Maestra	85	64.40	8
ATLAS.ti	101	76.51	5
Power BI	106	80.30	3

Paperpal	91	68.93	7
Scribbr	56	42.42	9
Quillbot	130	98.48	2
Lateral	40	30.30	10

Table 6: Favourite AI tool and its ranking

Data presented in Table 6 indicate the favourite AI tool and its ranking by the Library and Information Science Scholars. The Semantic Scholar (100%) AI tool is their favorite and ranked first, followed by Quilbot (98.9%) ranked second, Power BI (80.3%) ranked third, and Elicit (78.3%) ranked fourth. Sixth to ninth-ranked listed respectively from Atlas.ti (76.5%), Paperpal (68.9%), Maestra (64.4%), and Scribbr (42.4%). Only 40 scholars have shown interest in a favorite tool for Lateral, and it is ranked tenth in this list.

Advantages of Using AI Tools in Research

Advantages	No. of respondents	Percentage
Improved efficiency and precision	94	71.21
Predictive analytics enabling informed decision-making	78	59.10
Task automation and cost efficiency	94	71.21
Streamlined text analysis	80	60.60
Real-time data insights	80	60.60
Seamless collaboration	52	39.39

Table 7: Advantages of Using AI Tools in Research

The advantages of using AI tools in research can be inferred from Table 7, in which most LIS scholars responded to improved efficiency and precision (71.2%), task automation & cost efficiency. Followed by streamlined text analysis (60.6%), real-time data insight, and predictive analytics, enabling informed decision-making (59.1%). Only 39.3% of very few respondents mentioned seamless collaboration as the advantage of using AI tools in research.

Challenges in using AI tools for research

Challenges	No. of respondents	Percentage
Potential for bias	98	74.24
Lack of human insight	132	100.00
Data quality dependency	100	75.75
Ethical concerns	101	76.51
High implementation costs	132	100.00
AI hallucination	110	83.33

Table 8: Challenges in using AI tools for research

As per Table 8, a hundred percent of respondents stated that lack of human insight and high implementation costs are major challenges to using AI tools for research. They also felt AI hallucination, ethical concerns, data quality dependency, and potential for bias.

Opinions about the limitations of AI tools for research

Limitations of AI Tools for Research	No. of respondents N(%)	No. of respondents N(%)
	Agreed	Not Agreed
AI tools rely on the data they're trained on. If the data is biased or inaccurate, the results can be misleading. It's crucial to evaluate AI outputs critically and not rely solely on them.	132 (100%)	0
AI tools can efficiently scan vast literature but may miss nuances or subtleties within research papers. In-depth analysis and critical thinking remain essential for a comprehensive understanding.	110 (83.33)	22 (16.17)
AI shouldn't replace the core research process. Researchers should use AI to streamline tasks, not	99 (75)	33 (25)

eliminate critical steps like evaluating source credibility and understanding research context.		
Sometimes, AI won't explain the reasoning behind its results. This lack of transparency can make it difficult to assess the trustworthiness of findings or suggestions.	103 (78.03)	29 (21.97)
AI tools might not cover all relevant sources, especially niche or emerging research areas. Supplement researcher searches with traditional methods like library databases and expert consultations.	132 (100%)	0

Table 9: Limitations of AI Tools for Research

Table 9 presents the number of respondents and the percentage of various limitations of AI tools for the research. All respondents agreed to the following two limitations. First, "AI tools rely on the data they're trained on. If the data is biased or inaccurate, the results can be misleading. It's crucial to evaluate AI outputs critically and not rely solely on them". Second, "AI tools might not cover all relevant sources, especially niche or emerging research areas. Supplement researcher searches with traditional methods like library databases and expert consultations". Half of the respondents disagreed with the following limitation: "AI shouldn't replace the core research process. Researchers should use AI to streamline tasks, not eliminate critical steps like evaluating source credibility and understanding research context".

What are the Challenges Faced by LIS Scholars When Using AI Tools?

Challenges	No. of respondents	Percentage
Direct URL Access	5	3.79
Low Internet speed	79	59.85
High cost of Internet	35	26.51
Page not found error	1	0.76
Lack of knowledge of proper Using strategy	12	9.09

Table 10: Challenges Faced by LIS Scholars When Using AI Tools

Though AI tools have become most popular for academic research, most AI tools are not client-based and are based on direct website access. There are obstacles to using AI tools among the respondents. The specific problems faced by the users are given in Table 10. Low Internet speed (59.8%) and high Internet cost (26.5%) are the major problems faced by the users. 9% of respondents also opined that a lack of knowledge of proper strategy use is one of the significant problems. Only one respondent felt that the page not found error was a problem when using AI tools. Therefore, it can be understood that slow Internet connection and high cost are the prime problems with using artificial intelligence tools.

Common Suggestions for LIS Scholars on How to Utilize AI Tools for Research

- Never forget that AI is meant to supplement, not to replace. It performs exceptionally well at activities like data analysis and literature reviews, but it cannot mimic the critical thinking and inventiveness necessary for research that has an impact. Researchers should use AI for monotonous jobs but concentrate their skills on analyzing data and making inferences.

- Share AI research methods and results to embrace open science. This can encourage responsible AI development and creative uses of AI tools, encouraging academic openness and cooperation.

- When employing AI technologies for academic research, researchers should be careful not to be biased. Social biases may be present in the data on which these systems are trained. As a result, researchers must assess the AI model's underlying assumptions closely to see if they are sound and pertinent to their research concerns. Researchers can also lessen prejudice by using data from various sources that reflect various viewpoints and demographics.

- Since AI tools for academic research are always changing, stay current on the most recent advancements in this area. These developments can be used to the work of any researcher. In addition to participating in workshops and training programs, researchers can join online communities and follow different blogs and newsletters, like "The Rundown AI," and more. Researchers in LIS (Library and Information Science) might also contact AI researchers whose work interests them.

- ❖ Check your findings. Even though AI has the potential to be very effective, its outputs must be validated to prevent false or misleading results. Please make sure the results are in line with your research objectives and the state of the field by carefully reviewing them.

Findings and Conclusion

Except for ChatGPT, this study presented ten potent AI tools for scholarly research, emphasizing each tool's unique capabilities and advantages as reported by the participants. Along with outlining recommendations and best practices for ethically using AI research tools, it also described the growing role of AI in academia. Research could benefit from even more integration and influence from AI tools. They will probably grow closer together, which may result in ground-breaking findings at the nexus of domains that don't seem to be related. However, ethical issues like bias and justice must be addressed as AI strengthens. In summary, using AI technologies for academic research with caution and a deep understanding of their advantages and disadvantages is important. Tools for artificial intelligence (AI) have a significant positive impact on research and education; they alter the way scientists learn, instruct, and find new data. Artificial intelligence holds promise for revolutionizing research and education. AI can potentially speed up research and discovery while improving learning efficiency, inclusivity, and personalization. However, using technology resources to enhance research and education, solve ethical issues, manage people, and use artificial intelligence responsibly is crucial.

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