

Usage of AI-Driven Utility Tools amongst Researchers of Andhra Pradesh Technical Institutes: A Survey

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ABSTRACT

The growth of science and technology, particularly Artificial Intelligence (AI), is clearly having a big impact across numerous areas, with education and research being particularly prominent. By utilising these AI-assisted digital technologies, one can assist in achieving objectives more quickly and accurately than ever before. The study intends to better understand how researchers are utilising AI-driven technologies for scholarly communications, including their usability, effectiveness, awareness, and different adaptation challenges. An online survey was conducted among technical professionals in the Andhra Pradesh region to assess the use of AI-driven tools for their research communication in the era of digital transformation. A total of 350 questionnaires were distributed in 16 technical colleges via email and social media by using the random sampling method and out of these, 272 complete and 25 incomplete responses were received. The data shows that while human interaction is still crucial, artificial intelligence's contribution to research articles is continuously rising. 40.44 % of the respondents regularly use AI-driven tools for their research, while 36.02 % of the respondents are highly familiar and 48.16 % are little familiar with them. AI tools are primarily employed for writing research articles and detecting plagiarism, showing slightly higher usage than others. The major obstacles to wider adoption are insufficient knowledge and confidence in AI technologies. Even though most respondents acknowledge the potential of AI-driven tools, there is still a lack of total faith in these technologies.

Keywords: Artificial intelligence; Natural language processing; Research communication; Technical sector; Utility tool

1. INTRODUCTION

AI- technologies' ongoing development and widespread application are changing different areas¹³, contributing to a shift in business and daily life. It has become the catchword of the day, appearing in the media, literature, conferences, seminars, and webinars. In today's fast-paced academic climate, researchers are constantly looking for new ways to optimise their workflow, expedite their research initiatives, and collect relevant data more quickly¹⁵. In the present era, researchers are facing tremendous pressure, especially young researchers in their career growth. The increasing demand of peer reviewers has forced the use of artificial intelligence in scholarly publishing. AI- tools have the capacity to detect patterns and relationships in data that may not be obvious to human researchers. This can assist researchers in making new findings, developing new theories, and identifying interesting research areas that may have been ignored. AI- tools can also assist in making more accurate predictions based on data¹⁸. Machine-learning algorithms can be trained to recognise patterns and trends, allowing them to make very accurate predictions about future events or outcomes¹⁷. AI-driven algorithms have opened up new avenues for creative

investigation of scientific knowledge in the field of scholarly publishing, which will likely change the role of science communication specialists going forward. The top editor of a medical magazine with more than 100 volumes published to date made the interesting prediction that, in the near future, "writing machines" will probably write scientific submissions and "reviewing machines" will likely assess them²². Two of the most important goals for scholarly publication projects are deadline compliance and minimising human error. AI tools provide a way for publication professionals to overcome obstacles. By reducing the amount of time and effort required for menial chores, AI has the potential to greatly reduce these obstacles and free up more time for critical thinking, research, and participation in intricate intellectual procedures²³.

2. TRANSFORMING RESEARCH PROCESS: THE ROLE AND IMPACT OF AI TOOLS

Artificial Intelligence (AI) tools have caused a paradigm change in research, altering old approaches and speeding up discovery across several fields. These instruments fulfill several functions, transforming the processes of gathering, analysing, and interpreting data. Additionally, by examining the body of literature and finding knowledge gaps, AI algorithms support the creation of hypotheses

by pointing researchers in the direction of fresh ideas. AI's predictive power considerably simplifies protocols and improves reproducibility in experiment design and optimisation. AI also makes it easier to conduct thorough literature reviews and synthesize knowledge, which improves researchers' capacity to simplify complex data and derive useful insights.

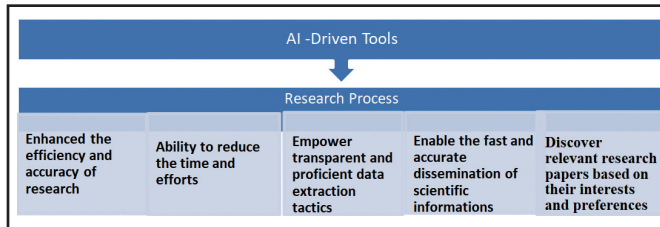


Figure 1. Impact of AI tools on research.

But as AI becomes more and more integrated into research projects, ethical questions around bias reduction and algorithmic transparency become crucial focal points, highlighting the necessity of responsible AI integration to preserve the validity and integrity of scientific research².

2.1 Research Area with the AI-driven Tools

Table 1. Research area

Work Space	
Academic search	Finding certain publications is made easier by AI-powered academic search engines like Litmaps, Connected Papers, and Semantic Scholar.
Language processing, prompt and conversation	Well-known AI-powered chat programs include Copilot, BingChat, Bard, and ChatGPT ¹⁴ .
Literature review	Researchers can filter topics from a paper's abstract and retrieving essential data components using AI-driven literature review tools, which can locate pertinent papers, summarize key ideas, and extract crucial information even in the absence of perfect keyword matching. Notable tools in this category include Elicit, Research Rabbit, and Scite.
Writing assistant	Writing quality is improved by AI-driven language processing programs like Grammarly, Paperpal, and Writesonic ¹² .
Summarization & paraphrasing	Tools for summarising research outputs powered by AI, such as QuillBot, Scispace, Humata, and Scholarcy.
Plagiarism checking	AI-driven plagiarism detectors like Copyleaks, Plag.ai, Duplichecker.com, and PlagiarismChecker.ai.
Data analysis	Machine learning is used by AI-driven data analysis systems to identify patterns like Google Analytics, IBM Watson Analytics.
Reference management	Reference management tools like Mendeley and Zotero, simplify the creation of citations and bibliographies ¹ .

3. OBJECTIVES

- To study the usability of AI-driven tools in research communications.
- To study the awareness of AI-driven utility tools within the research community.
- To study benefits and challenges associated with the implementation of AI-based utility tools in research activities.

4. AIM OF THE STUDY

The awareness, viewpoint, and application of AI tools among technical institute's researchers for their scholarly work are the exclusive focus of this study. The goals of the study are to investigate how researchers use AI-based tools in connection with their research, to find out what difficulties these academics have, the ways in which they use AI tools in their work, and the extent of their familiarity with these technologies. Samples of 16 technical institutes in Andhra Pradesh are selected based on the availability of their email, phone number, and social media links.

5. LITERATURE REVIEW

The relevant work on the subject has been carefully examined to find a variety of AI-driven tools that are especially made for research projects and the problems that come with them. Using terms like "AI-driven tools," "research communication," and "scholarly publishing," a thorough search was conducted across academic databases such as SCOPUS, IEEE, Springer, and Research Gate to undertake this literature evaluation. However, previous studies have primarily focused on the theoretical aspects of AI technology and the perceptions of teachers and students in academic settings.

In their review of several AI and related tools now under development or in use for a variety of publishing tasks and activities, Razack¹, *et al.* highlighted advancements in academic communications. Research and education are only two of the fields that Artificial Intelligence (AI) has completely transformed. Alqahtani⁴, *et al.* discussed how advances in natural language processing have improved our understanding and use of AI in these domains. Burger⁷, *et al.* investigated how AI is currently useful in research and how different research methodologies are improved by it. They offered a useful case study of Systematic Literature Reviews (SLRs) as an example of how to use AI in this vein. For non-native English speakers, writing in the scientific domain might be especially difficult. Dwivedi⁵, *et al.* proposed that AI tools can assist scientists in developing their scientific writing abilities in a variety of circumstances, guided by the principles of second language acquisition. Grajeda²¹, *et al.* study focuses on how AI tools are integrated into the School of Arts at a private institution in Latin America, with an emphasis on how students perceive it and how they feel about it.

According to Javaid⁶, *et al.* ChatGPT is based on cutting-edge technology including Machine Learning (ML), Natural Language Processing (NLP), and Deep Learning (DL). A useful tool for language education, ChatGPT is an expansion of a family of ML-NLP models known as Large Language Models (LLMs). It can translate text quickly, providing instructors with vital support. Venkatesh⁸ focused on the relationship between people and AI technologies and how operation management uses them to identify important challenges associated with the general availability of AI tools. In order to evaluate the current state of knowledge, attitudes, and clinical application of AI-enabled digital health solutions for patients with cardiovascular disease, as well as the obstacles to adoption, Schepart⁹, *et al.* employed mixed-method methodologies. Spyroglou¹⁰, *et al.* noted that the complexity of these processes and the need for specialisation contribute to the increased stress that researchers experience when leading or taking part in fundraising operations. They suggested several semi-automating steps in the application and proposal preparation procedures by using trans disciplinary AI techniques. Gołab-Andrzejak¹⁹ in his article described how, in the era of digital transformation, AI-based tools are useful for digital marketing.

6. METHODOLOGY

The study employed a mixed research methodology with a descriptive approach. The entire process involved content analysis, a comprehensive literature review, and an online survey via email and social media by using the random sampling method in the time period of November 2023-January 2024. A range of professionals from 16 technical institutions in Andhra Pradesh, including colleges and universities, were chosen based on the availability of their communication addresses. The survey was administered using the Qualtrics (www.Qualtrics.com) survey tool to gather respondents' perceptions and knowledge regarding AI-driven utility tools for enhancing their research communications. Out of 350 distributed surveys, 272 complete and 25 incomplete responses were recorded and analysed.

The survey consisted of two parts, A and B, and was intended to investigate statistically significant relationships between participants' age, gender, academic standing, and participation in research. Section A concentrated on demographic data and research engagement, while Section B examined academics' knowledge about and use of AI-driven tools in their research pursuits. The Qualtrics survey tool and Microsoft excel were used for the analysis. The statistical analysis was conducted using descriptive statistics, which included means, frequencies, percentages, and standard deviations. This gave an extensive understanding of the data as well as patterns and trends in the respondents' use of AI technologies.

Table 2. Responses received from selected technical institutes for analysis

S. No.	Institutes	Responses
1.	Aditya Institute of Technology and Management, Vishakhapatnam	17
2.	AITS, Ananthpuram	12
3.	DVR & Dr HS MIC College of Technology, Krishna	21
4.	GITAM Deemed to be University, Vishakhapatnam	18
5.	KL (Deemed to be) University, Guntur	25
6.	NEC, Guntur	12
7.	PVP Siddhartha Institute of Technology, Vijayawada	12
8.	Sir C. R. Reddy College of Engineering. Eludu	20
9.	Sri Vasavi, Tadepalligudem	16
10.	Sri VCET, Chittoor	12
11.	SVR Engineering College, Nandayal	11
12.	SRM University AP	19
13.	University College of Engineering, Narsaraopet	17
14.	V R Siddhartha Engineering college, Vijayawada	19
15.	VFSTR University, Vadlamudi	21
16.	VIT-AP University	20
Total Responses		272

7. DATA ANALYSIS & INTERPRETATION

7.1 Demographic Characteristics of Participants

Table. 3 presents the gender distribution of the 272 complete responses, revealing that 62.50 % of respondents are male and 37.50 % are female. This indicates the proportion of male respondents is almost double that of female respondents.

Five age groups of respondents were identified, and the below table listed the age groups that participated in the survey most frequently. As the accompanying table illustrates, researchers between the ages of 36 and 40 (34.56 %) have engaged at a little higher rate than other age groups. The mean age group, approximately 36-40, exhibits a significant dispersion around the average age, with a standard deviation of 1.27 and a variance of 1.60.

Regarding the academic positions of the respondents, 23 (8.46 %) are professors, 63 (23.16 %) are associate professors, 152 (55.88 %) are assistant professors, and 34 (12.50 %) are research scholars. This figure highlighted that the majority of respondents are assistant professors. A thorough understanding

of the use and familiarity with AI tools across various levels of academic expertise and responsibility is made possible by the diversity of academic positions.

Table 3. Demographic profile

Demography	Details	Frequency	Percentages (%)
Gender	Male	170	62.50
	Female	102	37.50
Age Group	30-35	67	24.63
	36-40	94	34.56
	41-45	41	15.08
	46-50	45	16.54
	>50	25	9.19
Academic Position	Professor	23	8.46
	Assoc. Professor	63	23.16
	Asst. Professor	152	55.88
	Research Scholar	34	12.50

7.2 Descriptive and Inferential Analysis

7.2.1 Frequency of Research Related Activities

The frequency of research related activities among the respondents is depicted in Fig 2. It demonstrates that 38.68 % (n=109) of the respondents engaged daily in their research-related work, 29.22 % (n=85) on a weekly basis, 13.99 % (n=34) on a monthly basis, and 18.11 % (n=44) on an occasional basis. It is evident from the distribution that a large number of respondents are in fact participating in their research activities on a daily and weekly basis.

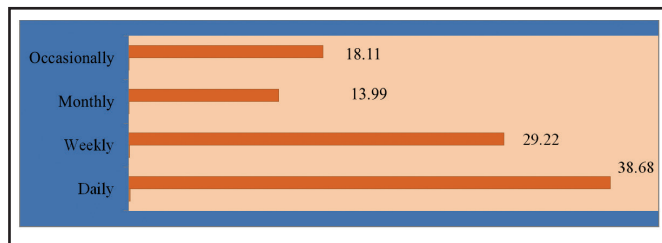


Figure 2. Frequency of research activities.

Researchers were asked if they had ever used AI-driven technologies in their work or if they were familiar with them. Regarding utilisation and familiarity with AI research communication platforms, we discovered a range of replies.

7.2.2 Perceptions and Competence of AI-driven Tools

Figure 3 shows that a significant number of respondents', 40.44 % (n=110) used AI-driven tools frequently for their research, emphasising how much these technologies are being used. Whereas 35.29 % (n=96) used them occasionally, and 24.27 %

(n=66) never used them. Regarding familiarity with AI-driven tools, 36.02 % who said they are highly familiar, 48.16 % of members said they are little familiar, compared to 15.80 % who said they are completely unfamiliar with AI-driven tools and techniques, highlighting the necessity of educational programs to close this knowledge gap and improve general proficiency with AI-driven research methods.

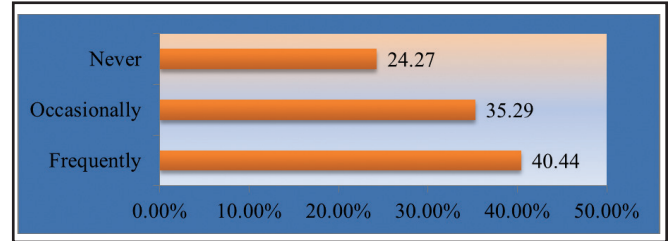


Figure 3. Usage of AI-driven tools.

In Table 4, the types of tools used by researchers and their familiarity with AI-driven technologies in their routine research operations are highlighted. The analysis that was received is shown below.

The table 4 depicts that most of the faculty members and researchers preferred to use AI-driven reference tools (79.49 %), data analysing tools (75.98 %), summarising or paraphrasing tools (71.96 %), and research organisation tools (65.67 %) more frequently than others for their research activities. The 21 (26.92 %) respondents who marked "other" option provided some other reasons for using AI-driven tools, i.e. tools for developing training, and deploying machine learning models, data visualization tools, etc.

Table 5 demonstrates that when it comes to drafting research articles (38.97 %) and detecting plagiarism (41.17 %), researchers primarily rely on AI-driven technologies. Furthermore, data analysis (28.67 %), reference organisation (32.35 %), and literature reviews are common uses for these technologies. This distribution highlights the tools' versatile usefulness at different phases of the research and writing process.

7.2.3 Effectiveness of AI Tools in Research Advancements

To understand the effectiveness of AI-driven tools for their research communications, we asked them questions about their satisfaction by using a Likert scale in 3 parameters: very effective, somewhat effective, and not effective at all. The responses received and the analyses are presented in Table 6.

Table 6 data shows that respondents had differing views on how useful AI technologies are for improving their research. A mean score of 7.43 (52.53 %) was recorded by the group of respondents who believe AI tools are very effective at supporting their study. Respondents who scored a mean of 7.35 (48.48 %) for AI technologies that they regard to be somewhat effective came in close second. The mean score for individuals who think AI technologies are completely ineffective for their research, on the other hand, was lower, at 6.75 (17.68 %). These numbers show a general trend in which most respondents, albeit with varying degrees of excitement, accept the effectiveness of AI tools for research to some extent.

Table 4. Preferred AI tools

AI tools	Use (%)	Cumulative (%)	Not use (%)	Cumulative (%)	Total
Natural Language Processing (NLP) tools	75(43.35)	8.99	98(56.65)	18.49	173
Literature Mapping/Literature review Tools	91(52.60)	19.90	82(47.40)	33.96	173
Reference Tools	155(79.49)	38.48	40(20.51)	41.50	195
Summarization/Paraphrasing Tools	136(71.96)	54.79	53(28.04)	51.50	189
Prompt and Conversation Tools	69(45.70)	63.06	82(54.30)	66.98	151
Data Analyzing Tools	155(75.98)	81.65	49(24.02)	76.22	204
Research Organization Tools	132(65.67)	97.48	69(34.33)	89.24	201
Other than Above	21(26.92)	100	57(73.08)	100	78

Table 5. Purpose for using AI tools

Purpose	Count	Percentages (%)
Preparing an abstract	49	18.01
Writing of research article	106	38.97
Writing book chapters	24	8.82
Writing reviews	43	15.80
Literature review	66	24.26
Summarization of literature	49	18.01
Checking of plagiarism	112	41.17
Preparing thesis/dissertation	41	15.07
Data analysis	78	28.67
Organizing references	88	32.35
Other than above	10	3.67

Table 6. AI tools for enhancing research

Effectiveness of AI tools	Mean	Standard deviation	Variance
Very effective	7.43	0.66	0.43
Somewhat effective	7.35	0.7	0.49
Not effective at all	6.75	0.74	0.54

Table 8. Difficulties faced by the respondents

Problems	Disagree (%)	Neither agrees nor disagree (%)	Agree (%)	Total
Lack of technical expertise	18.87(40)	27.83(59)	53.30(113)	212
Integration of AI tools with current workflows is difficult.	20.79(42)	32.18(65)	47.03(95)	202
Lack of quality datasets	13.73(28)	36.76(75)	49.51(101)	204
Limitations of computing infrastructures	18.81(38)	28.71(58)	52.48(106)	202
AI-related ethical issues	15.79(30)	35.79(68)	48.42(92)	190
Other than above	16.67(16)	43.75(42)	39.58(38)	96

7.2.4 Difficulties Encountered During Use of AI-driven Tools

Table 8 describes the difficulties faced by the respondents at the time of using AI-driven tools. Lack of technical expertise (53.30 %) and limitations of infrastructure (52.48 %) are some common problems respondents faced during the use of AI-driven tools. Another problem is the lack of quality datasets (49.51 %), the integration of AI tools in their workflow (47.03 %), and AI-related ethical issues (48.42 %), which are the main constraints in using AI tools for their research workflow.

8. DISCUSSION

The current study is an attempt to explore the way AI-driven utility tools influence the researchers' workflow in literature mapping and literature review, academic search, summarisation, plagiarism checking, and reference management in this vibrant era of Artificial Intelligence (AI).

Half of the respondents (52.53 %) of this study work in the technical education field, especially in engineering courses and conceded that by employing AI-driven technologies; the research could be done quickly which is advantageous in

research. The main advantage of applying AI technologies in research is the rapid analysis of the data, and it will take less time (73.11 %). A team of researchers used to take weeks or months to complete a task in the past, but now it has become possible to finish in seconds or minutes because of AI algorithms. Consequently, researchers can analyze large datasets and acquire insightful data within shorter amount of time compared to the time taken in the usage of conventional techniques.¹⁵

But some respondents have faced problems in utilizing the benefits of AI tools as they don't have the technical knowledge (53.30 %) and basic infrastructures (52.48 %) to use them. Memarian and Doleck²⁰ in their study also highlights the need for adequate technical infrastructure and training for educators and students to effectively implement AI tools. Schepart⁹ identifies parallel difficulties in the medical sector, such as the requirement for advanced technical infrastructure and knowledge for using AI tools efficiently. As AI technologies have the potential to unintentionally pick up biases from data and produce biased results or discriminatory behavior, they raise ethical (48.42 %) questions about accountability, transparency, and bias. Duymaz & Tekin²⁴ similarly in their study on academic writing focuses on how Artificial Intelligence (AI) can improve content quality, facilitate writing, and solve ethical issues surrounding AI use in academic publishing. Some are perplexed about the reliability of these AI tools, as plenty of AI driven products are accessible and there is no standard scale to determine the quality of datasets (49.51 %). Access to personal data is necessary for AI technologies, which raises questions about security and privacy. If the system is not properly secured, there is a chance of unwanted access, data breaches, or misuse of data. Based on the study's results, it can be inferred that the use of AI tools in research communication may gradually increase to help bridge the digital divide.

9. LIMITATIONS

The present research may have a restricted generalisation due to its focus on a particular subset of professionals. It is possible that the respondents' comments and the study's conclusions were impacted by their obvious lack of resources and artificial intelligence knowledge. In order to provide a more realistic appraisal of AI's potential in research communications, it is imperative that these gaps be filled in future studies. Even with these drawbacks, this research provides a solid basis for future investigation into this quickly developing sector. It is imperative that researchers' viewpoints be taken into account in debates concerning educational technologies, since the findings provide insightful information for individuals involved in the integration and regulation of AI-driven tools in research-related works. Simultaneously, continued study into usage scenarios will be essential for the successful creation of such framework conditions, given the dynamic nature of AI tool development and use.

It is also crucial to recognise that the data used in our analysis was gathered in November 2023, providing a particular

moment in time within the quickly changing field of artificial intelligence. Therefore, as new applications and awareness increase, it is expected that the reported usage and attitudes toward AI tools will also change. The dynamic nature of AI technology may cause alterations to usage habits and perceptions over time, so it is important to take this dynamic context into account when interpreting our findings.

10. CONCLUSION

The application of AI technology in research is expanding, but in order to comprehend its applications and challenges, it is necessary to continue significant research to uncover the barriers. Understanding its applications and challenges can help researchers make better use of it, improve the quality of their research and create more individualised and diverse learning environments.

Therefore, the study revealed that the uses of AI technology in research are growing and effective (52.53 %), extensive research needs to be done to identify the barriers, and understanding its applications and difficulties can help researchers make better use of it, enhance the quality of their research, and create more individualised and diverse learning environments.

During the time of our study, it was observed that researchers are enthusiastic to learn (76.85 %) and are prepared to get trained for new technologies, which will help them employ the new tools in their research. In order to enhance intelligent search and recommendation, collaboration and cooperation, data analysis, and modeling, the majority of respondents (61.76 %) recommend using an AI-model in the future. The respondents perceived great possibilities in AI for connecting knowledge and knowledge-creators.

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