



Status and Potential of AI Tools for Research Work: a Case Study at Visva-Bharati, West Bengal

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Abstract

Artificial Intelligence (AI) tools are slowly and steadily showing their presence in our daily life including research activity. The study AI tools application status in various research activity was carried out through online survey from selected research scholars and faculty members of Visva-Bharati (A Central University), Santiniketan, West Bengal, India. Major areas of AI uses were in literature review, paraphrasing, PPT preparation including applications in various research activities. The researchers at Visva-Bharati (A Central University) were leaning heavily towards using Semantic Scholar, with 30.5% of them choosing it as their go-to AI tool for academic work. The chart and percentages indicated that the most common uses of AI tools were for paraphrasing (42.4%), followed by literature review (40.7%), and PPT making (30.5%). There is a growing consensus that AI should be integrated into faculty training programs and student curricula across higher education institutions (HEIs). Moreover, several responses stressed the importance of information security in the use of AI and the development of tools under ethical guidance. Overall, there is high potential of using AI tools for day-today research work at the higher education institute.

Keywords: AI tools, academic research, Academic Integrity, literature review, paraphrasing, Visva-Bharati

1. Introduction

Artificial intelligence (AI) refers to computer systems which is capable of perform different complex tasks generally carried out only by human, such as reasoning, decision making, or solving deeper problems. Artificial intelligence is branch of computer science that is concerned with developing new systems which can replicate human intelligence and grow problem-solving capabilities. AI generally collects myriads of data, process it, and learn from its current and past analysis to streamline and improve in the future (Duvander, 2019). However, a normal computer program may need human interference to fix bugs and improve processes. In the late 1900s, when computing power was mostly dependant on human brains, the British mathematician Alan Turing planned of a machine capable of advancing far past its original programming (Hodges, 2004).

AI has experienced significant growth in recent years, with a marked increase in AI-related developments, including research outputs, publications, open-source software updates, and patents (Baruffaldi et al., 2020). The new development has been supported by the evolution and expansion of AI techniques, leading to a wider range of practical applications in commercial and industrial settings (Duvander, 2019; Munakata, 1995). OpenAI unveiled the Dall-E multimodal AI system, capable of producing images based on textual prompts in

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2021. In the next year, OpenAI launched ChatGPT, offering a chat-oriented interface to its GPT-3.5 LLM (Ray, 2023).

Research is a process of seeking out answers to a specific problem or group of ideas. Research is conducted systematically, and it adds to a body of knowledge and supports many theories. Research publication has been considered as a major output of a particular research work, taking the research finding to the users and other researchers. The traditional method of manual script preparation, especially student research publication, is time-consuming, labor-intensive, and prone to inconsistency (Olivier et al., 2001; Tanno & Zhang, 2015). To reciprocate these challenges, various approaches have been proposed. For instance, automation tools have been developed and recommended for testing the scripts and making appropriate revisions.

On the other hand, academic journal writing is a crucial aspect of scholarly communication, which supports dissemination of knowledge and innovation (Obeagu et al., 2023). It is particularly effective in promoting reflection on professional practice, with feedback on the level of reflection being particularly impactful (Ibarreta & McLeod, 2004). Despite its time-consuming affair, journal writing is valued by both scholars and professional for its ability to stimulate and integrate critical thinking and may provide optimistic growth. Journal writings also make the research work long live and available for all types of stakeholders such as students, researchers, end users and planners.

According to Bornmann and Williams (2017), research performance in the future (as indicated by a citation-based indicator) can be predicted using the Journal impact factor, which is based on citations. This is an intriguing finding since, among other organisations, funding agencies and research managers frequently utilise journal metrics to evaluate early-career researcher performance and to choose which academics to support or hire in the future.

The ability of a machine or computer system to mimic and carry out operations that normally require human intelligence, such as learning, problem-solving, and logical reasoning, is known as artificial intelligence (AI). Artificial intelligence (AI) technologies aim to mimic cognitive processes such as perception, reasoning, learning, and decision-making (Morandín-Ahuerma et al., 2024). Any machine that demonstrates human-like traits like learning and problem-solving can also be referred to as artificial intelligence. In contrast to natural intelligence, which is exhibited by humans and animals and involves consciousness and emotionality, artificial intelligence is intelligence displayed by computers (Nagendraswamy, 2021).

The rapid advancement of artificial intelligence (AI) technology has led to a proliferation of AI-powered tools that are having a significant impact in the realm of academic writing to automate various aspects of the editorial process, from research to proofreading and even generating complete high-quality scientific articles (Caprioglio & Paglia, 2023). The issue of the dependability and accuracy of text produced by AI is a concern, especially in scientific writing where precision is crucial. Concerns have also been raised over the possibility that AI will be used to create fake or plagiarised content, which could damage the validity of scientific findings.

This study seeks to investigate and evaluate the usage, attitude towards and impact of artificial intelligence (AI) tools in academic research by the faculties and authors, at Visva-Bharati (A Central University). The study aims at exploring the areas where AI is primarily used to improve research work and productivity, what difficulties are encountered in its

adoption AI technologies, and how AI may change the course of research in the coming years in different fields of study.

2. Methodology

A comprehensive survey was among the faculty and research scholar conducted at Visva-Bharati (A Central university), aimed at exploring researchers' engagement with Artificial Intelligence (AI) and the extent of their familiarity with AI tools in academic research. The study sought to examine not only what researchers knew about AI but also the specific tools they employed for various academic activities

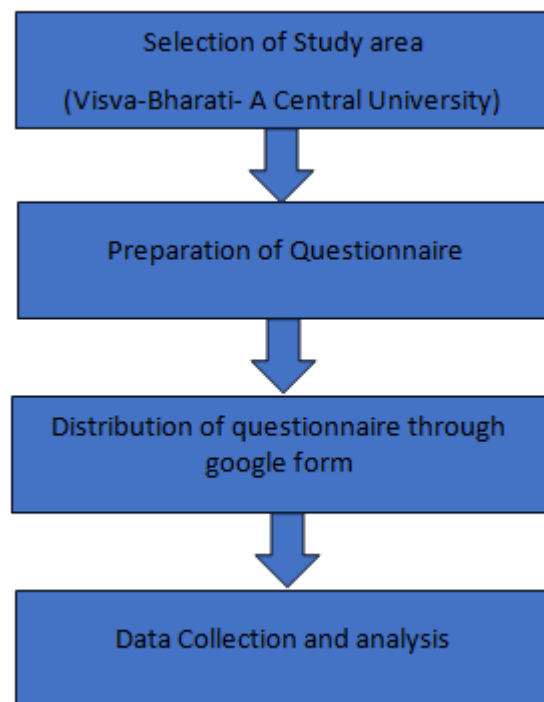


Figure 1: Flow chart of activities

The target population for the survey included faculty members and scholars from various departments at Visva-Bharati Central University. The email addresses of faculty members were collected from the official Visva-Bharati University website, ensuring access to a reliable and accurate contact list. An email containing a link to the online survey was sent to the faculty members, along with a request to circulate the survey among their research scholars. Approximately 30% of the recipients responded to the survey. Given the academic context and the nature of the survey, this response rate is considered representative enough to provide insights into the use of AI in academic research at the university. The survey adhered to standard ethical guidelines. Participation was voluntary, and respondents were assured of the confidentiality and anonymity of their responses. No personal identifying information was collected apart from the email addresses.

3. Data Analysis

The responses were collected and organized using Google Forms. Quantitative data were analysed using descriptive statistics and the trend was observed. Qualitative responses from open-ended questions were categorized and thematically analyzed to extract recurring themes and insights regarding the perceptions and future potential of AI in academic research.

4. Results

4.1. Status of AI tool awareness

The findings revealed a significant level of awareness among the respondents: 88.1% indicated they were cognizant of AI tools used in academic research. In contrast, a small minority(6.8%)reported being unaware of these tools, while 5.1% of total respondent expressed uncertainty regarding their knowledge of AI in this domain.

This survey highlighted the growing integration of AI within academic research practices and points to a predominantly informed research community with a modest fraction remaining either uninformed or undecided.

Regarding the use of AI tools in scholarly research, the survey showed that 62.7% of participants have adopted these technologies to improve and optimize their research activities. This finding implies a high degree of integration of AI-enhanced technologies into the academic domain. Nevertheless, interestingly, only 37.3% of respondents have not integrated such high-tech devices into their research practices so far, which is the primary sign of a notable gap between knowledge and real application of AI in academic activities. This leaves opportunities for better information and education that could fill this gap and ensure further engagement with AI tools.

4.2. Explanation of AI Tools Usage in Research Activities

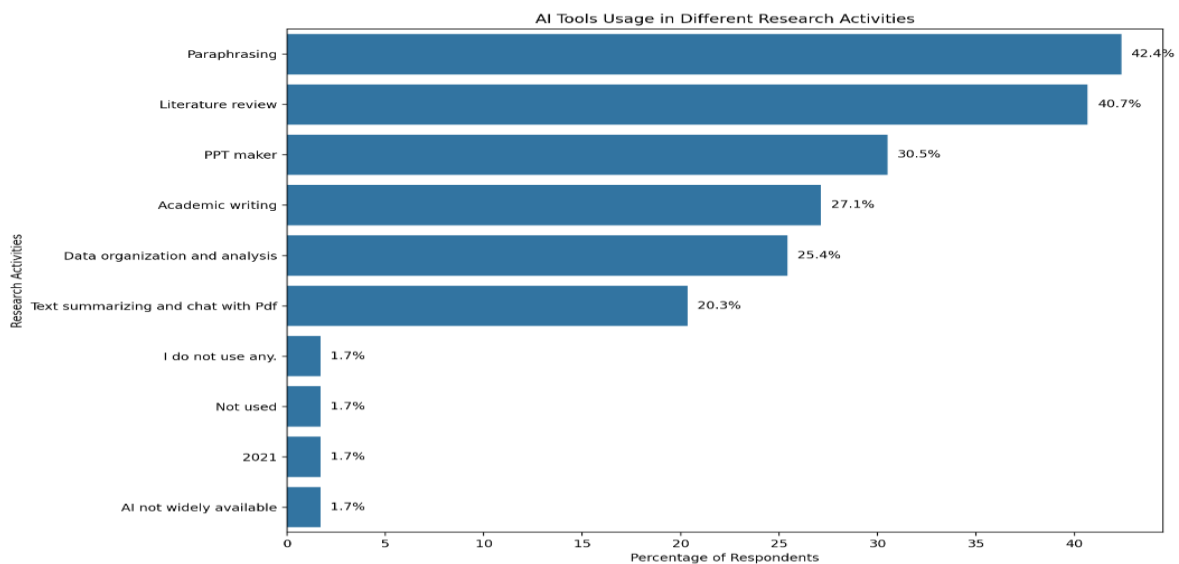


Figure 2: Status of AI tools for research application

This bar plot (Fig.2) visualized the percentage of respondents using AI tools for different research activities, highlighting the most common uses.

This analysis involved a survey dataset where respondents reported their use of AI tools in various research activities. The chart and percentages indicated that the most common uses of AI tools were for paraphrasing (42.4%), followed by literature review (40.7%), and PPT making (30.5%). Other activities include academic writing, data organization and analysis, and text summarizing. A small percentage of respondents indicated that they did not use AI tools for any activities.

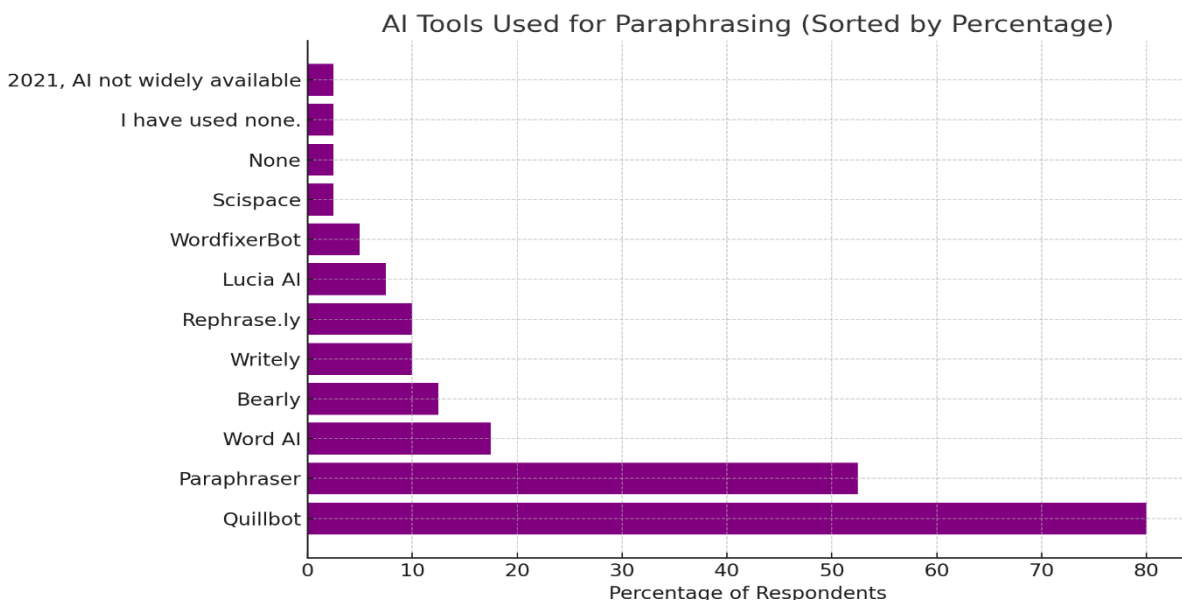


Figure 3: AI tools used for paraphrasing

The chart (Fig. 3) illustrated the percentage of respondents using various AI tools for paraphrasing, with Quillbot being the clear leader, used by 80% of participants. Paraphraser followed closely, with more than half of the respondents (52.5%) utilizing it for academic purposes. Tools, such as Word AI, Bearly, and Writely showed moderate usage, indicating their relevance but lower penetration in comparison to the top two. Interestingly, a small percentage of participants (around 2.5%) reported that they do not use any AI tools for paraphrasing, suggesting either a preference for manual methods or limited awareness of these tools. Similarly, Scispace and other less common tools, like Lucia AI and WordfixerBot, have been adopted by only a handful of users, pointing to their emerging nature in this space. This data highlights the growing dominance of well-established AI tools in academic paraphrasing while shedding light on the varied landscape of AI adoption.

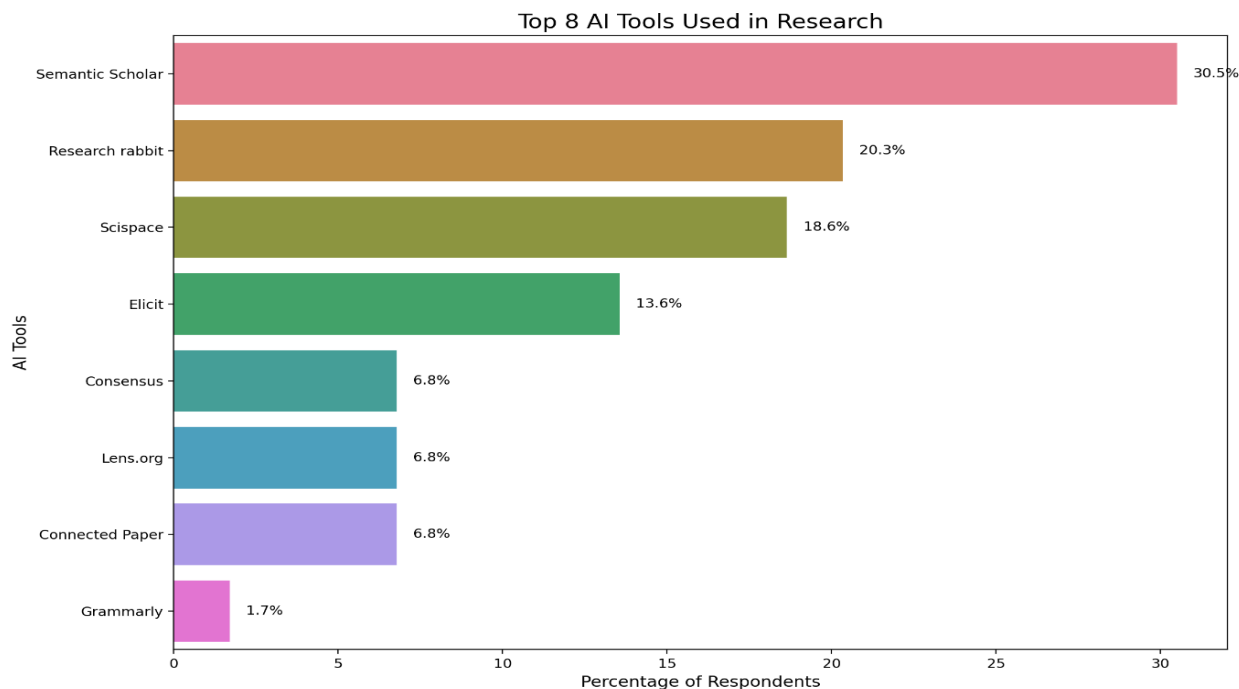


Figure 4: Top AI tools used in research

The researchers at Visva-Bharati (A Central University) are leaning heavily towards using Semantic Scholar, with 30.5% of them choosing it as their go-to AI tool for academic work (Fig. 4). Research Rabbit and Scispace follow closely, used by 20.3% and 18.6% of the participants, respectively, both valued for helping organize and format research more effectively. Elicit was also gaining traction, with 13.6% of researchers using it to synthesize information and answer research questions. Other tools, like Consensus, Lens.org, and Connected Paper, each used by 6.8% of respondents, play more specialized roles in areas like evidence-based searching, patent research, and mapping citations. Interestingly, Grammarly, despite its popularity for writing, was only used by 1.7%, suggesting that researchers are more inclined toward AI tools focused directly on research discovery and management.

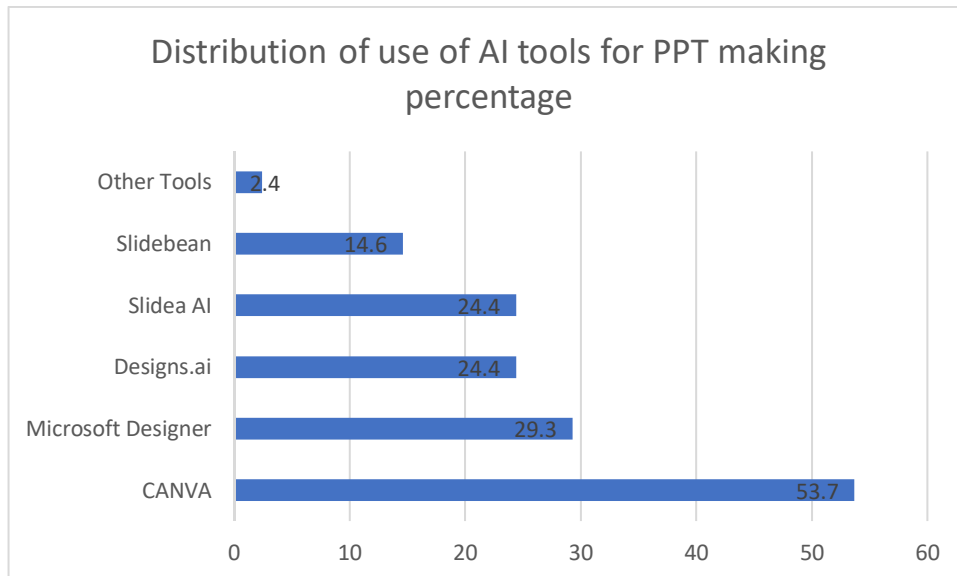


Figure 5: Distribution of AI tools for PPT making

In this survey of 59 respondents, approximately 98.3% reported using AI tools for creating PowerPoint presentations (Fig.5). The most prevalent tool among users is CANVA, utilized by 18.6% of respondents. This data suggests a significant adoption of AI-assisted presentation creation tools within the surveyed population, with a diverse range of options being employed. The distribution indicates varying levels of tool preference and potentially differing awareness or accessibility of these AI solutions among the respondents. Further investigation into the factors influencing tool selection and the impact of these AI tools on presentation quality and efficiency could provide valuable insights for educational technology implementation and digital literacy initiatives.

4.3. Frequency of AI Tool Usage in Research

The data revealed varying frequencies of AI tool usage among researchers. The majority of respondents (38.98%) reported using AI tools rarely, while 23.73% indicated weekly usage. Monthly usage was reported by 15.25% of respondents, and only 5.08% reported daily use. This distribution suggests that while AI tools have penetrated academic research, their integration into regular workflows is not yet ubiquitous. The predominance of rare usage may indicate that researchers are still in the exploratory phase of AI tool adoption or that these tools are perceived as supplementary rather than essential to their research processes.

4.4. Sources of Learning about AI Tools

The survey results indicate that online resources are the primary source of information about AI tools, with 37.29% of respondents relying solely on this medium. Interestingly, combinations of learning sources are also prevalent. For instance, 5.08% of respondents reported learning from both colleagues and online resources, while another 5.08% utilized a combination of colleagues, online resources, and conferences/workshops. This multi-faceted approach to learning about AI tools suggests a diverse information ecosystem within academia. The relatively low percentage (3.39%) of respondents who included university

training programs in their learning sources may indicate an opportunity for academic institutions to enhance their role in AI tool education.

4.5. Perceived Benefits of AI Tools in Academic Research

The data revealed a multifaceted perception of AI tools' benefits in academic research. The most comprehensive benefit set, including timesaving, improved accuracy, enhanced productivity, better data management, and improved quality of research output, was reported by 16.95% of respondents. Timesaving as a standalone benefit was cited by 11.86% of respondents, while improved accuracy and a combination of timesaving and improved research quality were each reported by 6.78% of respondents. This distribution suggests that researchers recognize multiple advantages of AI tools, with efficiency and quality improvement being prominent themes.

4.6. AI Tools' Impact on Research Efficiency

Regarding the statement "AI tools have significantly improved my research efficiency," the responses show a balanced distribution. Equal proportions of respondents (25.42% each) selected ratings of 4 and 3 on a 5-point scale, indicating a moderate to strong agreement. However, 15.25% strongly disagreed (rating 1), while 13.56% somewhat disagreed (rating 2). Only 11.86% strongly agreed (rating 5). This distribution suggests a generally positive perception of AI tools' impact on research efficiency, but also indicates a significant minority who do not perceive such benefits.

4.7. AI Tools' Impact on Research Output Quality

The data shows a more positive skew regarding AI tools' impact on research output quality. The majority of respondents (35.59%) rated their agreement as 4 out of 5, indicating strong agreement. Moderate agreement (rating 3) was expressed by 20.34% of respondents. Interestingly, equal proportions (18.64% each) strongly disagreed (rating 1) or somewhat disagreed (rating 2). Only 6.78% strongly agreed (rating 5). This distribution suggests that while there is a general positive perception of AI tools' impact on research quality, there remains a significant portion of researchers who are skeptical or have not experienced such benefits.

4.8. Cost as a Barrier to AI Tool Adoption

The perception of cost as a barrier to AI tool adoption shows a relatively normal distribution. The highest proportion of respondents (23.73%) expressed moderate agreement (rating 3), closely followed by 22.03% who strongly agreed (rating 4). Notably, 15.25% somewhat disagreed (rating 2), while 11.86% strongly agreed (rating 5), and 10.17% strongly disagreed (rating 1). This distribution suggests that while cost is perceived as a significant barrier by a substantial portion of researchers, opinions are varied, possibly reflecting differences in institutional support, personal resources, or the perceived value of AI tools relative to their cost.

4.9. AI Tools' Role in Maintaining Academic Integrity and Ethical Standards

The data regarding AI tools' role in maintaining academic integrity and ethical standards shows a cautious perspective. The highest proportion of respondents (27.12%) expressed moderate agreement (rating 3), while 22.03% somewhat disagreed (rating 2). Strong agreement (rating 4) was expressed by 18.64% of respondents, while 11.86% strongly disagreed (rating 1), and only 8.47% strongly agreed (rating 5). This distribution suggests a complex and nuanced view of AI tools' relationship with academic integrity and ethics. The concentration of responses in the middle range (ratings 2-4) indicates that researchers recognize both potential benefits and risks associated with AI tools in maintaining ethical standards in research.

This analysis reveals a complex landscape of AI tool adoption and perception in academic research. While there is general recognition of the benefits these tools can offer, there are also significant concerns and varied experiences among researchers. These findings suggest a need for further research into the factors influencing AI tool adoption, as well as potential areas for improvement in tool design, accessibility, and integration into academic workflows.

4.10. Awareness of Ethical Guidelines

The data indicates that a significant portion of respondents (50.85%) were not aware of any ethical guidelines provided by their university for using AI tools in research. This lack of awareness could potentially lead to ethical challenges in research practices, as researchers may inadvertently violate ethical standards. The 35.59% of respondents who were aware of such guidelines suggested that there is a need for universities to enhance communication and training regarding ethical practices in AI tool usage.

4.11. Importance of Upholding Academic Integrity

A substantial majority of respondents (47.46%) rated the importance of upholding academic integrity when using AI tools as very high (rating 5). This underscores the critical role that academic integrity plays in the research community, especially in the context of emerging technologies like AI. The emphasis on integrity suggests that researchers are conscious of the ethical implications of AI tools and are committed to maintaining high standards in their work.

4.12. Impact of Data Privacy Concerns

Data privacy concerns significantly impact the application of AI tools in research, with 32.20% of respondents expressing strong concern (rating 5). This highlights the importance of addressing privacy issues to facilitate the broader adoption of AI tools. The data suggests that researchers are wary of potential privacy breaches and are likely to be cautious in their use of AI tools unless these concerns are adequately addressed.

4.13. Ensuring Academic Integrity

The most common method for ensuring academic integrity while using AI tools is a combination of proper citation, plagiarism checks, following ethical guidelines, and peer review, as reported by 23.73% of respondents. This multifaceted approach indicates that researchers are employing a comprehensive strategy to uphold integrity, recognizing that no

single method is sufficient on its own. The emphasis on multiple strategies reflects the complexity of maintaining integrity in the digital age.

4.14. Challenges in Using AI Tools

The data revealed that the most significant challenge faced by researchers in using AI tools is the need for enhanced training programs, improved access to AI tools, and better technical support, as indicated by 11.86% of respondents. This suggests that while AI tools offer substantial benefits, their effective use is hindered by a lack of resources and support. Addressing these challenges could lead to more widespread and effective use of AI in research.

4.15. Staying Updated on AI Tools

Online forums and communities are the most popular means of staying updated on new AI tools and technologies, as reported by 18.64% of respondents. This preference for online resources highlights the dynamic and rapidly evolving nature of AI technologies, where traditional methods of information dissemination may not suffice. The reliance on digital platforms suggests that researchers value timely and accessible information to keep pace with technological advancements.

4.16. Potential Risks of AI Tools

The potential risks associated with AI tools in academic research are diverse, with concerns about plagiarism, loss of creativity, and over-reliance on technology being prominent. The data suggests that while AI tools offer significant advantages, they also pose risks that could undermine the quality and originality of research. Researchers are aware of these risks and are likely to approach AI tool usage with caution, balancing the benefits against potential drawbacks.

5. Recommendation

The survey data presented a wide range of perspectives on the integration of AI tools in academic research, with an overarching emphasis on the need for ethical frameworks and rigorous training. Respondents highlighted the necessity for proofing, screening, and strong ethical guidelines to prevent potential misuse of AI. A common sentiment is the impact of AI on language learning, where reliance on AI for corrections in spelling, grammar, and punctuation may hinder the development of strong language skills in research students. Traditional teaching methods and a lack of institutional support were cited as significant barriers to the widespread adoption of AI tools. There is a growing consensus that AI should be integrated into faculty training programs and student curricula across higher education institutions (HEIs). Moreover, several responses stressed the importance of information security in the use of AI and the development of tools under ethical guidance. While some respondents raised concerns about the diminished creativity associated with overreliance on AI, others emphasized the importance of proper training and hands-on experience to ensure responsible use. Finally, there was a clear acknowledgment that AI will continue to play a growing role in academia, making ethical awareness and comprehensive training indispensable for maintaining academic integrity and fostering innovation.

6. Conclusion

The status study of AI tools application in various research activity was carried out through online survey from selected research scholars and faculty members of Visva-Bharati (A Central University), Santiniketan, West Bengal, India. Major areas of AI uses were in literature review, paraphrasing, PPT preparation including applications in various research activities. There is a growing consensus that AI should be integrated into faculty training programs and student curricula across higher education institutions (HEIs). Moreover, several responses stressed the importance of information security in the use of AI and the development of tools under ethical guidance.

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