Use of Artificial Intelligence Tools in Physical Science Education and Research at Mangalore University

Amaresh Hanumappa*
amareshdh363@gmail.com,
Renuka*
renukhanaik@gmail.com,
Kavyashree*
kavyamangalore27@gmail.com,
Shivaraja Ramachandragouda*
shivarajapatil55@gmail.com.
*Research Scholar Department of Library and Information Science, Mangalore University, Mangalagangothri, Mangalore – 574199, Karnataka.

Umesha Naik
Chairman, Dept. of Library and Information Science, Mangalore University, Mangalore – 574199, umeshanaik@gmail.com

Abstract

The study examines awareness, perceptions, and use of AI-based research tools among students, faculty, and research scholars in Mangalore University's Department of Physical Sciences. Utilising a survey method, it gathered responses from 105 out of 110 participants (95.4% response rate). Findings reveal that 98.0% are aware of AI tools, 97.1% use them, and they believe AI significantly enhances research and learning. Key benefits identified include faster data processing and language learning, with 95.2% using ChatGPT and 91.4% employing AI for educational purposes. A notable 90.4% expressed a need for training. The study suggests libraries can facilitate the transition to AI-enabled research by reconsidering their roles to include training and support for ethical AI usage.

Keywords

Artificial intelligence, AI tools, Physical science, Mangalore University, Search pattern.

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1. Introduction

Artificial Intelligence (AI) has emerged as a transformative force across various fields, including the physical sciences. With the increasing availability of computational power and data-driven approaches, AI tools are now widely used in research, modelling, simulation, and data analysis. Disciplines such as physics have particularly benefited from AI applications, ranging from predictive modeling and image recognition to automated data processing and machine learning algorithms for complex problem-solving. In higher education, the integration of AI into teaching and research is gaining momentum globally. Universities are beginning to adopt AI-based tools to enhance learning experiences, improve research efficiency, and foster innovation. However, the pace and extent of adoption can vary significantly depending on institutional infrastructure, faculty awareness, and training opportunities. The purpose of this study is to investigate the present level of awareness and application of AI tools in Mangalore University's physical science departments. It seeks to determine which tools are being used, what their functions are, and the obstacles encountered when using AI tools. This paper discusses specific actions libraries and librarians at Mangalore University can take to overcome these challenges and outlines a strategic plan to foster a sustainable, inclusive AI culture within the physical sciences. Libraries can help the shift to AI-enabled learning and research environments by rethinking their traditional functions. They can offer capacity-building initiatives, support data management and open science practices, curate access to AI and data science materials, and encourage the ethical and responsible use of AI.

2. Review of literature

Kumar and Maranna (2024) purpose of the study is to find out how many science postgraduate students at Sharnbasva University in Kalaburagi are aware of and have access to Internet-based electronic information resources (EIR). The study's primary goals are to determine why the Internet-based EIR is used. The study used a survey approach. Most postgraduate science students have access to the EIR and are aware of internet-based electronic information resources. Yim and Jiahong (2024) examine the pedagogical methodologies, learning resources, assessment techniques, and student learning results in AI literacy instruction in K–12 environment. This study reviews 46 studies published

in scholarly journals and conference proceedings. Alimi et al. (2021) used a three-section questionnaire and a descriptive research design in the assessment study. The developed hypotheses were addressed and tested at the 0.05 level of significance using descriptive and inferential statistics. According to the study's findings, most university students are unaware of the use of artificial intelligence for learning, and there was no discernible difference in the awareness of this use between male and female students. This study found that students' awareness of and access to digital technologies determine their capacity to investigate digital resources, including artificial intelligence.

Chun-Hung Lin et al. (2021) developed pre-test and post-test questionnaires to examine how well students performed across several AI-related areas. We found from the surveys that the suggested learning approach can successfully increase AI literacy among non-engineering students with 328 students participating in these learning events. Additionally, this study found that the STEM-based AI curriculum increased students' understanding of AI ethical dilemmas, particularly among low-AI-literate students, and that there was a substantial correlation between students' AI literacy and their knowledge of these issues. This article covers the relationship between learning activities and many facets of AI learning. Teachers who wish to include AI expertise into general education courses can utilise the suggested approach.

Fitria (2021) highlights that the learning process needs to be innovative and creative to meet the evolving demands of education. As AI advances in education, it will assist with everyday tasks such as teaching and learning. This study aims to investigate AI in education, particularly in the teaching and learning process. Abayomi et al. (2020) examined awareness and perceptions of artificial intelligence among Nigerian university library managers, given the increasing prevalence of AI in wealthy nations. Both qualitative and quantitative methods are used in the study's survey design. The study's population comprised 80 academic librarians from 8 purposefully selected university libraries nationwide. The study's conclusions revealed that academic librarians are aware of AI use in university libraries, and their primary obstacle to implementing the technology is concern about job security.

3. Objectives of the study

- To assess the level of awareness of AI-based academic tools;
- To identify the types of AI-based tools used for leaching, teaching and research;
- To evaluate the extent and frequency of AI tools usage;
- To examine the challenges faced in using AI tools.

4. Methodology

The study adopted a survey method, and primary data were collected by using a structured questionnaire. This covers only physical science subjects, including General Physics, Medical Physics, and Electronic and Materials Science. The 110 structured questionnaires were distributed to students, research scholars, and faculty members of the Department of Physical Science at Mangalore University, of which 105 responses were received. The collected data was scrutinized, tabulated, and analysed using Microsoft Excel.

5. Results and discussion

5.1. Demographic information

Table 1: Demographic information

Sl. No.	**Demographic information**		**Frequency**	**%**
1	Gender	Male	49	46.6
		Female	56	53.3
2	Residential area	Rural	60	57.1
		Urban	38	36.1
		Semi urban	7	6.6
3	Current designation	Student	79	75.2
		Research Scholar	18	17.1
		Faculty	8	7.6

Table 1 show’s that the 56 (53.3%) female and remaining 49 (46.6%) are male. Regarding the residential area, 60 respondents (57.1%) are from rural, 38 (36.1%) are from urban areas, and only 7 (6.6%) are from semi-urban areas. In terms of designation, the majority of respondents, 79 (75.2%), are students, 18 (17.1%) research scholars, and only 8 (7.6%) faculty members.

5.2. Awareness of AI tools

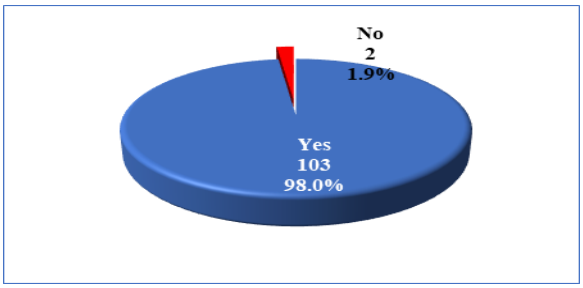

Figure 1: Awareness of AI tools

Figure 1 shows that 103 respondents (98.0%) are aware of AI tools, while only 2 (1.9%) are not.

5.3. Level of Awareness of AI Tools

Table 2: Level of awareness of AI tools

AI tools	Scale				
	5	**4**	**3**	**2**	**1**
ChatGPT	56 (53.3%)	32 (30.4%)	13 (12.3%)	3 (2.8%)	1 (0.9%)
Copilot (Bing AI)	4 (3.8%)	21 (20.0%)	30 (28.5%)	20 (19.0%)	29 (27.6%)
Gemini (Bard)	12 (11.4%)	32 (30.4%)	30 (28.5%)	18 (17.1%)	12 (11.4%)
Claude AI	16 (15.2%)	9 (8.5%)	18 (17.1%)	22 (20.9%)	40 (38.0%)
Meta AI	42 (40.0%)	24 (22.8%)	20 19.0%)	13 (12.8%)	5 (4.7%)
IBM Watson	4 (3.8%)	7 (6.6%)	23 (21.9%)	13 (12.3%)	57 (54.2%)
Microsoft Azure	7 (6.6%)	7 (6.6%)	28 (26.6%)	20 (19.0%)	42 (40.0%)
MATLAB	13 (12.3%)	10 (9.5%)	26 (24.7%)	24 (22.8%)	31 (29.5%)
TensorFlow	3 (2.8%)	12 (11.4%)	25 (23.8%)	22 (20.9%)	42 (40.0%)
Origin	45 (42.8%)	27 (25.7%)	17 (16.1%)	11 (10.4%)	4 (3.8%)
Wolfram Mathematical	4 (3.8%)	14 (13.3%)	26 (24.7%)	20 (19.0%)	40 (38.0%)

Note=5= Extremely aware 4= Aware 3= Moderately aware 2= Not aware 1=Not at all aware

Table 2 indicates that 56 (53.3%) respondents are extremely aware of ChatGPT, 45 (42.8%) of Origin. However, only 4 respondents (3.8%) are extremely aware of Wolfram Alpha. Additionally, 32 respondents (30.4%) are very aware of both ChatGPT and Gemini (Bard), while only 7 (6.6%) are very aware of IBM Watson and Microsoft Azure. Regarding moderately aware, 30 respondents (28.5%) are moderately aware of Copilot (Bing AI) and Gemini (Bard), while only 13 (12.3%) are moderately aware of ChatGPT. When it comes to slight awareness, 24 respondents (22.8%) are slightly aware of MATLAB, and 20 (19.0%) are slightly aware of Copilot (Bing AI), Microsoft Azure, and Wolfram Mathematical. Only 3 respondents (2.8%) are slightly aware of ChatGPT. Notably, 57 respondents (54.2%) are not at all aware of IBM Watson, while only 1 (0.9%) respondent is not at all aware of ChatGPT.

5.4. Contribution of AI tools to research and learning

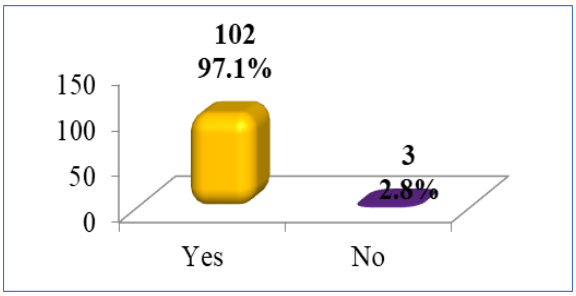

Figure 2: Contribution of AI tools to research and learning

Figure 2 shows that 102 (97.1%) respondents believe AI tools can contribute significantly to research and learning, while only 3(2.8%) respondents do not.

5.5. Factors that contribute significantly to research and learning

Table 3: Factors that contribute significantly to research and learning

Sl. No.	Contributing factors	Frequency	%
1.	Faster Data Processing	80	76.1
2.	Enhanced Literature	55	52.3
3.	Automated Experimentation	28	26.6
4.	Plagiarism Detection & Writing Assistance	53	50.4
5.	Personalized Education	51	48.5
6.	AI-Powered Tutoring	49	46.6
7.	Language Learning	80	76.1
8.	Automated Grading & Assessment	30	28.5
9.	Interactive & Engaging Content	26	24.7

Table 3 shows the factors that contribute significantly to research and learning. The majority of respondents, 80 (76.1%), identified that AI's major contribution is faster data processing and language learning. Additionally, 53 (50.4%) respondents reported plagiarism detection and writing assistance, while only 26 (24.7%) mentioned interactive and engaging content.

5.6. Familiarity with AI tools

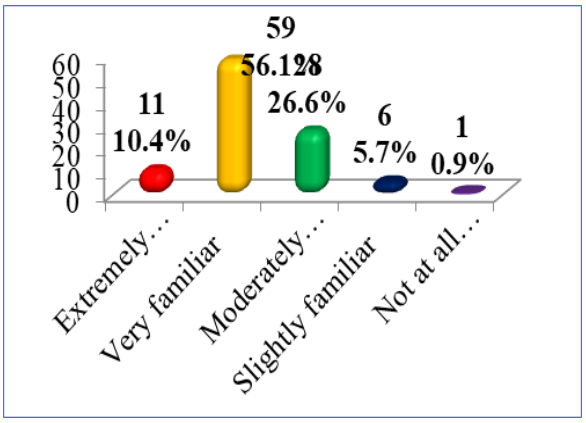

Figure 3: Familiarity with AI tools

As shown in Figure 3, out of 105(100%) respondents, 59 (56.1%) reported being very familiar with AI tools, 28 (26.6%) were moderately familiar, 11 (10.4%) were extremely familiar, and only 1 respondent (0.9%) was not at all familiar with AI tools.

5.7. Use of AI tools

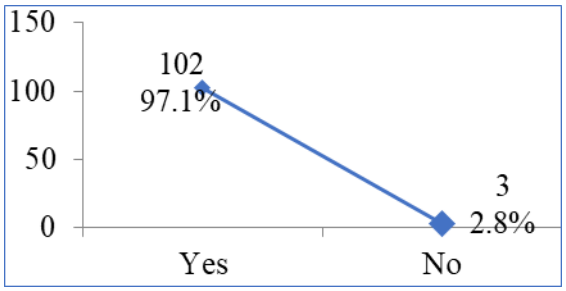

Figure 4: Use of AI tools

Figure 4 shows that the majority of the respondents 102 (97.1%) make use of AI tools, and only 3 (2.8%) respondents do not use AI tools.

5.8. Frequency of using AI tools

Table 4: Frequency of using AI tools

Sl. No.	Frequently	Frequency	%
1.	Daily	37	35.2
2.	Weekly	47	44.7
3.	Monthly	5	4.7
4.	Fortnightly	1	0.9
5.	Occasionally	16	15.2

Table 4 presents the frequency of AI tool use in the physical science discipline. It shows that 47(44.7%) respondents use AI tools weekly, 37(35.2%) respondents use them daily, and only 1 (0.9%) respondent uses them fortnightly.

5.9. Using AI tools in academic work

Table 5: Using AI tools in academic work

Use of AI tools	Yes		No	
	Frequency	%	Frequency	%
ChatGPT	100	95.2	5	4.7
Copilot (Bing AI)	31	29.5	74	70.4
Gemini (Bard)	57	54.2	48	45.7
Claude AI	19	18.0	86	81.9
Meta AI	81	77.1	24	22.8
IBM Watson	8	7.6	97	92.3
Microsoft Azure	21	20.0	84	80.0
MATLAB	27	25.7	78	74.2
TensorFlow	18	17.1	87	82.8
Origin	81	77.1	24	22.8
Wolfram Mathematical	17	16.1	88	83.8

Table 5 shows that the usage of various AI tools in academic work. A majority, 100(95.2%) respondents, reported using ChatGPT, while 5(4.7%) respondents did not. Additionally, 81(77.1%) respondents reported using Origin in their work, whereas 24(22.8%) respondents did not. For Gemini (Bard), 57 (54.2%) respondents indicated they use it in their work, while 48 (45.7%) respondents do not. Only 17 (16.1%) respondents reported using Wolfram Mathematical, and 88 (83.8%) respondents indicated they do not use it.

5.10. Purpose of using AI tools

Table 6: Purpose of using AI tools

Sl. No.	Purposes	Frequency	%
1.	Data analysis	65	61.9
2.	Simulation and modelling	16	15.2
3.	Research projects	60	57.1
4.	Visualization of results	29	27.6
5.	Machine learning applications	22	20.9
6.	Improve skills	75	71.4
7.	Prepare for the test	51	48.5
8.	Learning	96	91.4
9.	Teaching	45	42.8
10.	Others	2	1.9

Table 6 shows that a majority of respondents (96, 91.4%) use ICT tools for learning, 75 (71.4%) for improving skills, 65 (61.9%) for data analysis, and only 2 (1.9%) for other purposes.

5.11. Challenges faced in using AI tools

Table 7: Challenges faced in using AI tools

Sl. No.	Challenges faced in using AI tools	Frequency	%
1.	Lack of knowledge or training	58	55.2
2.	Lack of access to tools or software	31	29.5
3.	Time constraints	53	50.4
4.	Difficulty in understanding AI concepts	33	31.4
5.	The result is not complete/accurate	54	51.4
6.	High-cost AI implementation	43	40.9
7.	Loss of concentration when using AI	19	18.0
8.	Other	2	1.9

Table 7 shows that 58 (55.2%) respondents identified lack of knowledge or training as a challenge in using AI tools, while 54 (51.4%) respondents identified that incomplete or inaccurate results were a challenge. Only 2 (1.9%) respondents indicated that they faced other types of challenges.

5.12. Orientation/training programs on AI tools

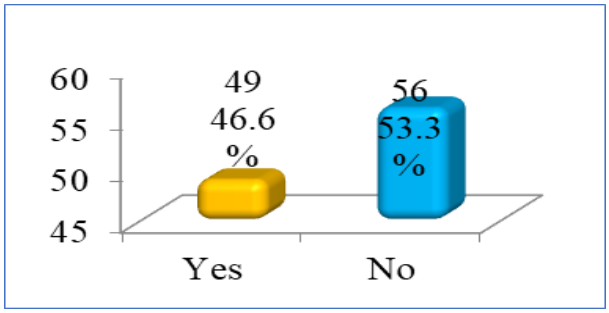

Figure 5: Orientation/training programs on AI tools

Figure 5 shows that 49 respondents (46.6%) received orientation, training, or programs on AI tools, while 56 respondents (53.3%) did not.

5.13. Type of training attended

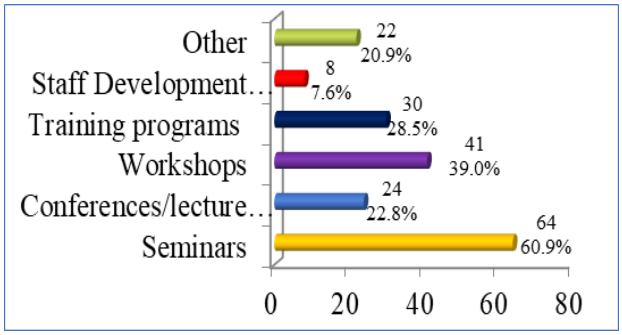

Figure 6: Type of training attended

Figure 6 indicates that 64 (60.9%) respondents attended seminars, 41 (39.0%) respondents attended workshops, and only 8 (7.6%) respondents participated in staff development programs.

5.14. Need for orientation/training programs on AI tools

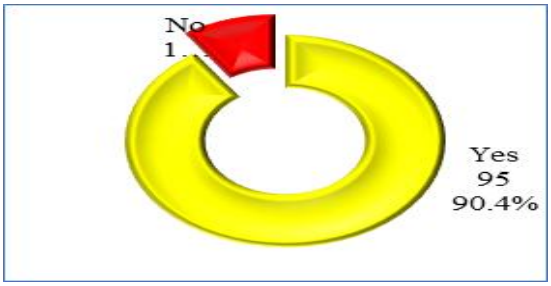

Figure 7: Need for orientation/training programs on AI tools

Figure 7 presents the need for orientation/training programs on AI tools. The majority of the respondents. 95 (90.4%) need training, and only 10 (9.5%) of users do not require.

6. Findings of the study

- The majority of respondents (103, 98.0%) are aware of AI tools, and 102 (97.1%) use them.
- 102 (97.1%) respondents believe AI tools can contribute significantly to research and learning.
- The majority of respondents, 80 (76.1%), identified both faster data processing and language learning as significant factors contributing to research and learning.
- A majority, 100(95.2%) respondents, reported using ChatGPT and 96 (91.4%) use AI tools for learning
- The majority of the respondents, 95 (90.4%) need training for AI tools

7. Suggestions and recommendations

- It is suggested that AI tools be implemented to facilitate faster learning.
- It is advised that the concerned libraries conduct regular workshops on AI tools for students, research scholars, and faculty.
- It is recommended for the concerned authority to conduct awareness drives to introduce lesser-known but useful AI tools that are underutilised.
- It is suggested to promote awareness through seminars, workshops, and webinars, as well as the importance of using AI tools.

8. Conclusion

The study investigated the use and awareness of AI tools by physical science faculty, research scholars, and students of Mangalore University. From the results, it was found that the majority of physical science faculty, research scholars, and students are aware of AI tools and are also using some of them, such as ChatGPT and Origin, in their current studies. Although there is a notable lack of advanced AI applications such as machine learning and deep learning, most respondents are very familiar with AI tools, especially those used for learning, skill development, and data analysis. This emphasises the need for targeted workshops, training courses, and curriculum integration to close this gap and promote broader use of AI in research and education. Giving faculty, research scholars, and students these skills will preserve academic achievement and encourage creativity in physical science as AI continues to transform scientific research.

This paper outlines specific actions that libraries and librarians at Mangalore University can take to address these challenges. Key strategies include developing AI-ready information infrastructures, offering AI literacy and data management training, establishing research data repositories, providing ethical guidance on AI use, and fostering interdisciplinary collaboration. Through these targeted initiatives, university libraries can evolve into digital knowledge hubs that not only support but also drive innovation in AI-assisted physical science education and research.

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