



# **Ascertaining the Educational Efficacy of using Free Open-source Software Research Artificial Intelligence Tools: A Formulative Study at CPGS-AS, CAU(I), Umiam, Ri-Bhoi, Meghalaya**

**Pankaj Kumar <sup>a\*</sup>, R. J. Singh <sup>a</sup>, L. Devarani <sup>a</sup>  
and Th Onchoila Maring <sup>a</sup>**

<sup>a</sup> School of Social Sciences, College of Post Graduate Studies in Agricultural Sciences, (Central Agricultural University, Imphal), Umiam-793103, Meghalaya, India.

## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

## **Article Information**

DOI: <https://doi.org/10.9734/acri/2025/v25i21075>

## **Open Peer Review History:**

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://pr.sdiarticle5.com/review-history/130675>

**Original Research Article**

**Received: 02/12/2024**

**Accepted: 04/02/2025**

**Published: 08/02/2025**

## **ABSTRACT**

One of the most significant challenges students currently face is the task of writing and publishing research papers. This process requires a systematic and distinctive approach, including comprehensive analysis, critical interpretation, and the ability to synthesize research on a specific topic. In the current academic and professional landscape, proficiency in artificial intelligence (AI)

\*Corresponding author: Email: [pkram63933@gmail.com](mailto:pkram63933@gmail.com);

has become an essential prerequisite for students to excel in this domain. Although artificial intelligence (AI) has become increasingly important in academic research, there remains a paucity of studies exploring its application and impact. Therefore, the present study was conducted to examine the awareness and ascertain the efficacy of using Free and Open-Source Software (FOSS) AI tools in academic research among M.Sc. (Ag.) students at CPGS-AS, CAU (I), Umiam, Ri-Bhoi, Meghalaya. The study adopted a formative research design to achieve its objectives. Convenient sampling procedure was carried out in order to select 62 respondents. The scientific inquiry revealed that the majority of respondent (67.74%) were aware of Software Ownership; while 75.80% were knowledgeable about the features of FOSS, particularly its freedom to use FOSS AI tools. Additionally, more than half of the respondents (67.2%) reported learning about FOSS AI tools through social media and the internet. However, majority of respondents (79.03%) demonstrated low awareness of the use of FOSS AI tools in academic research. A statistically significant difference was found in the respondents' scores before and after the intervention of FOSS AI tools in academic research, indicating a marked improvement in efficacy among the students.

**Keywords:** *Artificial intelligence; free and open-source software (FOSS); awareness; effectiveness; students.*

## 1. INTRODUCTION

An automated device capable of simulating human cognitive processes, such as learning, reasoning, and self-correction, is classified under the broad domain of Artificial Intelligence (AI) (Popenici and Kerr, 2017). AI has demonstrated its potential to enhance student learning by offering personalized educational experiences tailored to individual needs, thereby improving academic performance (Hanaysha et al., 2023). Additionally, AI fosters the development of critical skills such as critical thinking, problem-solving, and creativity by creating collaborative environments where students can engage in problem-solving and project development activities (Melo et al., 2022; Alfalah, 2023). Beyond education, AI significantly contributes to academic research by improving efficiency and effectiveness across various fields. It facilitates the analysis and interpretation of extensive datasets, enables the creation of simulations and scenarios, and supports the clear communication of research findings (Alshater, 2022). However, despite its advantages, a significant barrier to adopting AI-driven learning tools, software, and materials is their cost, particularly in developing countries, as they are often embedded within proprietary systems. Free and Open-Source Software (FOSS) presents a viable solution to overcome these challenges (Gupta and Surbhi, 2018). According to the Free Software Foundation (2009), the concept of "free software" refers not to the absence of cost but to the users' freedom to use, share, and distribute software to benefit the community. FOSS is characterized by its open licensing, allowing

users to freely utilize, copy, study, and modify the software. By openly sharing source code, FOSS encourages collaborative efforts to improve software design and functionality (Binjha and Nayak, 2022).

A research paper is a type of academic or scientific writing that presents the procedure, in-depth analysis, and interpretation of research on a specific topic, and its creation is a complex and challenging process that demands significant time, effort, and advanced skills (Shrestha et al., 2021; Derntl, 2014). Key requirements for writing a research paper include originality, a well-defined methodology, proper formatting, accurate citation, and rigorous analysis, making the process particularly challenging for researchers (Kumar and Dhull, 2023). Traditionally, academic research has relied on tedious manual processes to sort and analyse large volumes of text (Dergaa et al., 2023; Nara et al., 2022). However, the advent of AI has significantly simplified scientific writing (Elsalam and Momen, 2023). AI-powered tools assist researchers by enhancing originality, improving writing quality, generating ideas, translating text, and managing references and citations efficiently. Furthermore, these tools enhance the readability of research papers and significantly reduce the workload for students. Some key FOSS AI-driven tools include: ChatGPT, an AI-powered tool, is designed to assist in various tasks such as writing, debugging, and drafting essays (Baidoo-Anu and Owusu Ansah, 2023; Tung, 2023). Quill Bot is an AI-powered paraphrasing tool that helps avoid plagiarism and improves academic writing quality (Syahnaz

and Fithriani, 2023). Sci-Space analyses scientific literature to identify key concepts and trends, providing suggested phrases, keywords, and citations for academic documents (Chandha et al., 2023). Mendeley, a reference management software, offers features like bibliographies, collaboration, and annotations (Singh et al., 2022). Zotero is a free, open-source tool that allows researchers to collect, organize, and analyse research, integrates with web resources, and offers features like tagging and advanced search options (Behera and Meher, 2022). Although artificial intelligence (AI) has become increasingly important in academic research, there remains a paucity of studies exploring its application and impact. Therefore, the present study was conducted to examine the awareness and ascertain the efficacy of using Free and Open-Source Software (FOSS) AI tools in academic research among M.Sc. (Ag.) students at CPGS-AS, CAU (I), Umiam, Ri-Bhoi, Meghalaya.

## 2. MATERIALS AND METHODS

The present study employed a formulative research design and adopted a convenience sampling method for data collection. This design was selected to enhance knowledge and familiarity with the phenomenon or subject under investigation. The research was conducted in the Indian state of Meghalaya, located in the northeastern region of the country. The sample comprised 62 postgraduate students from the College of Post-Graduate Studies in Agricultural Sciences (CPGS-AS), Central Agricultural University (CAU), Umiam, Ri-Bhoi, Meghalaya. The present study was conducted to examine the awareness and ascertain the efficacy of using Free and Open-Source Software (FOSS) AI tools. To evaluate the efficacy of these tools, the same group of 62 postgraduate students was invited to participate in a follow-up assessment 15 days after the initial study. However, only 30 participants responded to the post-test. Data for the study were collected using an online questionnaire designed in Google Forms and through an interview schedule. The analysis of awareness levels was conducted by calculating the frequency and percentage distribution of responses. To determine the efficacy of using FOSS AI tools in academic research, and to test hypothesis the non-parametric Wilcoxon Signed Rank Test was employed. The data were analysed using IBM SPSS version 23 and Microsoft Excel 2021.

## 3. RESULTS AND DISCUSSION

### 3.1 Demographic Profile

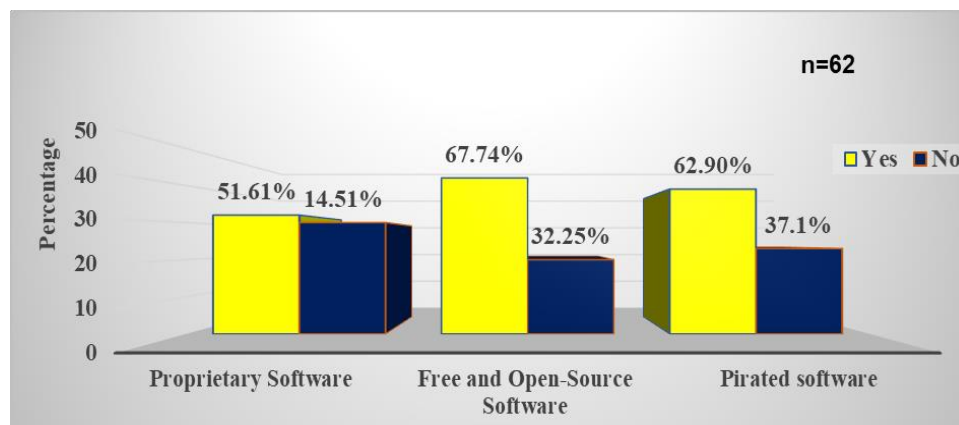
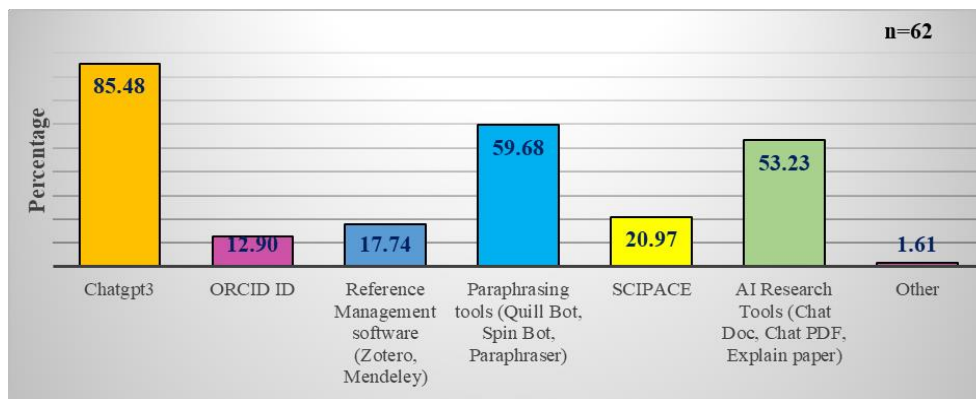
The demographic profile of the M.Sc. (Agri.) students from CPGS-AS is presented in Table 1. The distribution of respondents by age indicates that the mean age of the participants was 24 years. Rahman and Atikuzzaman (2024), Ocansey et al. (2021) and Alharbi and Tassaddiq (2021) also reported that maximum of the respondents belonged to the 23–25 years age group. This may be due to respondents almost completed their or enrolled into higher education. The gender distribution shows that 81% of the respondents were male, while 19% were female, suggesting active participation from both genders. A similar observation was also reported by Soni (2024), Hettige et al. (2022) and Rahman and Atikuzzaman (2024). This imbalance may reflect differences in interest, accessibility, or representation within the specific context or field of study. In terms of the respondents' current level of education, over 50% were enrolled in the second year of their M.Sc. program, followed by 45% in the first year and similar finding also observed by Hettige et al. (2022). Regarding the distribution across respective schools, the majority of respondents belonged to the School of Social Sciences (29%), followed by the School of Crop Protection (28%), the School of Crop Improvement (24%) and School of Natural resource management (19%). Rahman and Atikuzzaman (2024) also reported that most of the students participated in the survey from the Faculty of Social Sciences. This pattern may suggest varying levels of interest, relevance, or accessibility of the survey topic among students in these schools.

### 3.2 Awareness on Software Ownership

The findings presented in Fig. 1 indicate significant variation in respondents' awareness of different types of software ownership. It was observed that, (67.74%) of the respondents agreed that they are aware about free and open-source software (FOSS) and 32.25% only respondent was not aware about FOSS. Further, data revealed that (62.90%) of respondents are aware of pirated software, while (51.61%) demonstrate awareness of proprietary software and the results is supported by Nayak and Binjha (2022), Gupta (2018). It is possible for students to use software without being aware that it falls under the category of proprietary or free and open-source software.

**Table 1. Demographic information of respondents**

Variables	Categories	Frequency	Percentage
<b>Age</b>	20-22	10	16.12
	23-25	40	64.51
	26-28	12	19.35
<b>Gender</b>	Male	50	81
	Female	12	19
<b>Current level of education</b>	M.Sc. 1 <sup>st</sup> year	28	45
	M.Sc. 2 <sup>nd</sup> year	34	55
<b>School</b>	SSS	18	29
	SCP	17	28
	SCI	15	24
	SNRM	12	19

**Fig. 1. Distribution of respondents According to awareness on software ownership****Fig. 2. Distribution of respondents According to awareness on FOSS AI tools**

### 3.3 Awareness on FOSS AI Tools

The findings presented in Fig. 2 highlight notable variations in respondents' awareness of various FOSS AI tools used in academic research. The data indicate that a substantial proportion of respondents reported being aware of and utilizing tools such as ChatGPT (85.48%) and paraphrasing tools like QuillBot, Spinbot, and Paraphrasing Online (59.68%) respectively.

Findings are lines with the finding of Ahmad et al. (2024), Anih and Ukeh (2024), Shofiah and Putera (2024), Loana et al. (2024) and Asongo and Terkuma (2024). However, awareness of other AI tools was significantly lower. For instance, only 30.50% of respondents were aware of tools like Chat PDF, Chat Doc, and Explain Paper, while few were familiar with Sci Space (20.97%), reference management software such as Zotero and Mendeley

(17.74%), and ORCID iD (12.90%). This suggests a limited level of awareness among students regarding the majority of Free and Open-Source Software (FOSS) options.

### 3.4 Awareness on Features of FOSS AI Tools

The distribution of respondents based on their awareness of the features of Free and Open-Source Software (FOSS) is presented in Fig. 3. The data revealed that only 24.20% of respondents were aware of the FOSS feature emphasizing freedom of use. In contrast, a significantly larger majority, constituting 74.80% of respondents, were not aware of this fundamental feature. The similar results are also reported by Nayak et al. (2022). While 64.51% were aware of reliable feature of FOSS and nearly 53.2 % were responded to available source code. This suggests that while the majority of students may have been familiar with FOSS tools, they lacked a clear understanding of the fundamental characteristics and principles

that define Free and Open-Source Software (FOSS).

### 3.5 Source of Awareness on FOSS AI Tools

Fig. 4 illustrates the distribution of respondents based on their sources of awareness about Free and Open-Source Software (FOSS) AI tools. The data indicate that the majority of respondents (67.2%) reported gaining awareness of FOSS AI tools through the internet and social media platforms. The findings of the study are in line with the findings of Chao et al. (2021), Adarkwah et al. (2023) and Kang et al. (2022). In their study they also reported that majority of respondents were aware through the internet and social media. In contrast, a considerably smaller proportion (21.3%) indicated that their awareness through courses and academic syllabus. This may be due that informal and digital channels play a more prominent role in disseminating information about FOSS AI tools compared to structured educational programs.

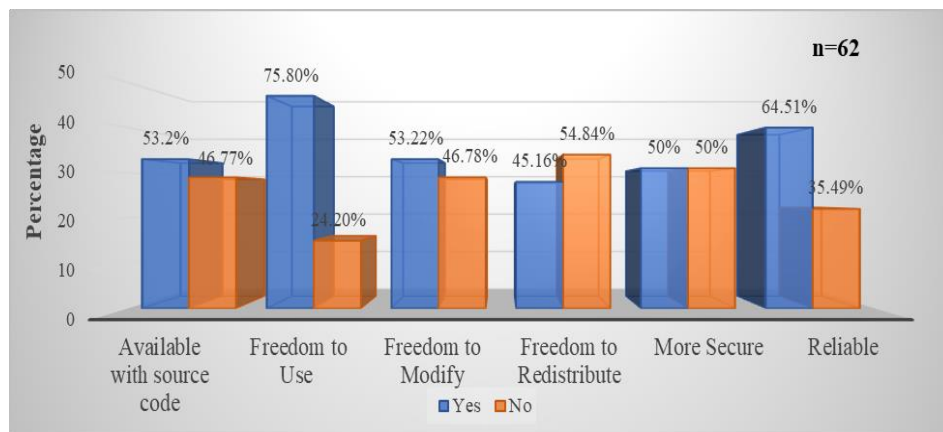


Fig. 3. Distribution of respondents According to awareness on features of FOSS AI tools

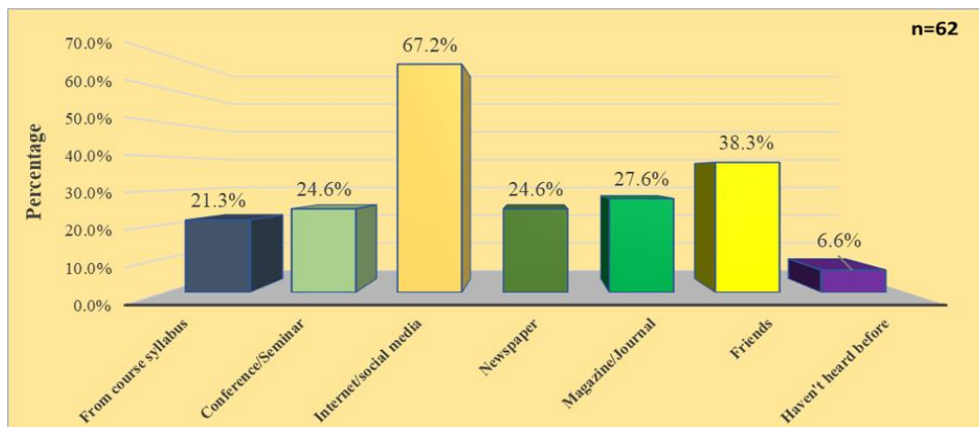
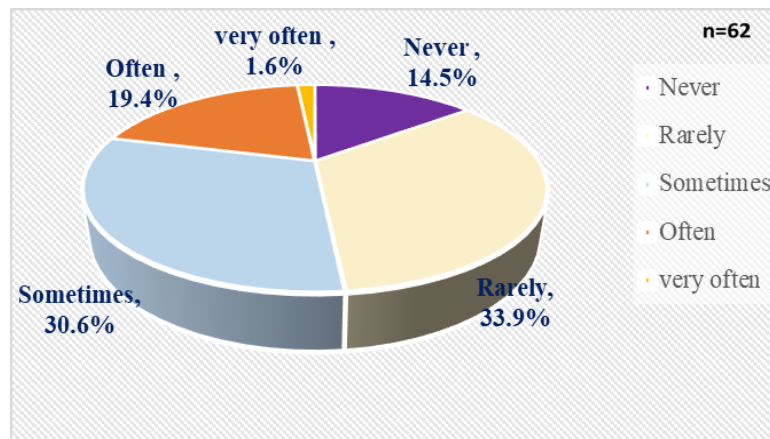


Fig. 4. Distribution of respondents According to source of awareness on FOSS AI tools



**Fig. 5. Distribution of respondents According to Frequency of usage FOSS AI Research tools**

**Table 2. Level of Awareness on use of FOSS AI Research tools**

Level of Awareness	Frequency	Percentage
High	13	20.97
Low	49	79.03

### 3.6 Frequency of usage FOSS AI Research Tools

The frequency of usage of FOSS AI research tools is summarized in Fig. 5. The data shows that 33.9% of respondents reported rarely using FOSS AI research tools in their academic work. This was followed by 30.6% who indicated using these tools sometimes, 19.4% who used them often, 14.5% who reported never using them, and only 1.6% who reported using them very often. The findings of the study similar to the findings of Khanchandani (2019), Jereb and Urh (2024) and Loana et al. (2024). In their study they also observed that respondent rarely using AI tools for their academic purpose.

### 3.7 Level of Awareness on use of FOSS AI Research tools

The level of awareness regarding the use of FOSS AI research tools in academic research is summarized in Table 2. The findings reveal that the vast majority of respondents (79.03%) exhibited a low level of awareness about FOSS AI tools in the context of academic research. In contrast, only 20.97% of respondents demonstrated a high level of awareness. Ventura and Lopez (2024), Alordiah et al. (2023), Adarkwah et al., (2023), Musa et al. (2020), Abirami and Kavitha (2019) Setiani et al. (2021) in there they also observed low level of awareness on AI-powered learning tools,

Bibliographic management software, ChatGPT, Digital tools, innovative instructional strategies and Plagiarism Detection Tools among the students of Post graduate students. It is possible that students may utilize software without being aware of whether it falls under the category of proprietary software or Free and Open-Source Software (FOSS).

### 3.8 The Efficacy on use of FOSS AI Tools in Academic Research

To determine the efficacy of using FOSS AI tools in academic research, the non-parametric Wilcoxon Signed Rank Test was employed.

#### Hypothesis testing:

H<sub>0</sub>: There is no significant difference in the score of the respondent before and after the class on FOSS AI tools.

H<sub>1</sub>: There is significant difference in the score of the respondents before and after the class on FOSS AI tools.

The hypothesis test results, summarized in Tables 3 and 4, indicate a significant difference in the respondents' performance scores before and after the instructional session on FOSS AI tools. The Wilcoxon signed-rank test ( $p < 0.05$ ) revealed that the percentage of successful scores improved significantly following the

**Table 3. Hypothesis Test Summary**

Asymptotic significances are displayed. The significance level is 0.05				
	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Before and After equals 0.	Related-Samples Wilcoxon Signed Rank Test	.000	Reject the null hypothesis.
The significance level @ 0.05.				

**Table 4. Result of Wilcoxon Signed Rank Test on use of FOSS AI tools in academic research**

		<b>n</b>	<b>Mean Rank</b>	<b>Sum of Rank</b>
<b>After - Before</b>	Negative Ranks	2	11.75	23.50
	Positive Ranks	27	15.24	411.50
	Ties	1		
	Total	30		

intervention. The sum of positive difference ranks ( $\sum R = 27$ ) was notably higher than the sum of negative difference ranks ( $\sum R = 2$ ), highlighting the positive impact of the instructional session. These findings demonstrate a statistically significant improvement in the respondents' scores after the intervention, underscoring the efficacy of the instructional session in enhancing students' understanding and application of FOSS AI tools in academic research. The result of the study supported by Tella et al. (2021, Ahmed et al., (2024), Santiago et al., (2023), Tran and Nguyen, (2022) and Monika et al. (2023) highlighted the positive impact of AI-based writing assistants on faculty members' efficiency by providing instant feedback, reducing the time and effort required for proofreading and editing.

#### 4. CONCLUSION

The study highlights the varying levels of awareness, utilization, and efficacy of Free and Open-Source Software (FOSS) and FOSS AI tools among M.Sc. (Agri.) students. Findings reveal that while a majority of students are aware of FOSS, their understanding of its core features and principles remains limited. Moreover, although students show familiarity with commonly used AI tools such as ChatGPT and paraphrasing applications, awareness of other essential tools like reference management software and academic resources remains low. The primary source of awareness for FOSS AI tools appears to be informal channels such as the internet and social media, with structured academic programs playing a less significant role. Furthermore, the frequency of use of FOSS AI tools in academic research remains relatively

infrequent, with the majority of students reporting either rare or occasional use. The hypothesis testing using the Wilcoxon Signed Rank Test demonstrated a significant improvement in the students' performance scores after participating in an instructional session on FOSS AI tools. This underscores the positive impact of targeted educational interventions in enhancing students' understanding and effective utilization of these tools for academic research. Overall, the study emphasizes the need for increased awareness, better integration of FOSS education into academic curriculum, and targeted training programs to enhance students' capabilities in leveraging FOSS and FOSS AI tools for academic and research purposes. Educational institutions should incorporate FOSS into ICT curricula and provide training for teachers and students to build proficiency. Technical support for installation, maintenance, and use is essential for sustainable adoption. Professors adopting FOSS can inspire students to integrate these tools into learning. However, many students lack clarity on FOSS benefits over proprietary software and face barriers to its adoption in higher education. Addressing these challenges can enhance awareness and integration of FOSS in academic and research activities.

#### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The Author(s) hereby declares that NO generative AI tools, such as (e.g., ChatGPT, Copilot) or text-to-image generators, have been used in the writing, editing, or preparation of this manuscript. All content presented is original and solely the result of the authors' own intellectual work.



## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

- Abirami, V. & Kavitha, E. S. (2019). A Study on the Awareness of Plagiarism Detection Tools among the Research Scholars of Periyar University, Tamil Nadu. *Asian Journal of Information Science and Technology*, 9(2), 40-44.
- Adarkwah, M. A., Amponsah, S., Vanwyk, M. M., Huang, R. Tili, A., Shehata, B. and Wang, H. (2023). Awareness and acceptance of ChatGPT as a generative conversational AI for transforming education by Ghanaian academics: A two-phase study. *Journal of Applied Learning and Teaching*, 6(2).
- Ahmad, M., Subih, M., Fawaz, M., Alnuqaidan, H., Abuejheisheh, A., Naqshbandi, V. Alhalaia F. (2024). Awareness, benefits, threats, attitudes, and satisfaction with AI tools among Asian and African higher education staff and students. *Journal of Applied Learning Teaching*.
- Ajav, I. G. & Tor-Akwer, H. F. (2024). Awareness, adoption and utilization of artificial intelligence (AI) by librarians for effective service delivery in university libraries in Benue State, Nigeria. *Journal of Library Services and Technology*, 6(3), 99-108.
- Alfalah, A. A. & Melo. (2022). Factors influencing students' adoption and use of mobile learning management systems (m-LMSs): A quantitative study of Saudi Arabia. *International Journal of Information Management. Data Insights*, 3, 100143.
- Alharbi, T. & Tassaddiq, A. (2021). Assessment of cybersecurity awareness among students of Majmaah University. *Big Data and Cognitive Computing*, 5(2), 23.
- Alordiah, C. O., Osagiede, M. A., Omumu, F. C., Okokoyo, I. E., Emiko-Agbajor, H. T., Chenube, O. & Oji, J. (2023). Awareness, knowledge, and utilisation of online digital tools for literature review in educational research. *Heliyon*, 9(1).
- Alshater, M. M. (2022). Exploring the role of artificial intelligence in enhancing academic performance: A case study of ChatGPT. *Available at SSRN 4312358*.
- ANIH. A. A. & UKEH, B. O. (2024). Awareness of Artificial Intelligence Assisted Tools for Research Writing Among Students in Federal University Otuoke, Bayelsa State. *FUO-Journal of Education and Research*, 3(3), 203-210.
- Asongo. S. T. & Akuse, S. S. (2024). Awareness and Utilization of Artificial Intelligence (AI) Tools for Enhanced Research among Postgraduate Students in Universities in Benue State, *International Journal of Innovative Science and Research Technology*, 9(9):1712-1720.
- Baidoo-Anu, D. & Ansah, O. L. (2023). Education in the Era of Generative Artificial Intelligence (AI): Understanding the Potential Benefits of ChatGPT in Promoting Teaching and Learning. *SSRN Electronic Journal*.
- Behera, M. & Meher, D. (NA) Zotero: An Overview of Open-Source Citation Management Tool for Researchers. *Indian Journal of Information, Library & Society*, 35 (1-2), 74-82.
- Binjha, P. B. & Nayak, K. (2022). Student's awareness of free and open-source software (FOSS) in higher education. *Asian Journal of Education and Social Studies*, 81-87.
- Chandha, S. R. S., & Ghosal, T. (2023). Setting the Scene: How Artificial Intelligence is reshaping how we consume and deliver research
- Chao, P. J., Hsu, T. H., Liu, T. P. & Cheng, Y. H. (2021). Knowledge of and competence in artificial intelligence: Perspectives of Vietnamese digital-native students. *IEEE Access*, 9, 75751-75760.
- Dang, T. M. L., Dao, T. A. & Nguyen, X. T. (2024). A Study on the Level of Awareness and Use of Artificial Intelligence Tools of Students at Viet - Hung Industry University. *International Journal of Research and Public Review*. 5(5):1872-1878
- Dergaa, I., Chamari, K., Zmijewski, P. & Ben, S. H. (2023). From human writing to artificial intelligence generated text: examining the prospects and potential threats of ChatGPT in academic writing. *Biology of Sport*. 40(2):615- 622.
- Derntl, M. (2014). Basics of research paper writing and publishing. *International Journal of Technology Enhanced Learning*, 6(2):105.
- Elsalam, K. A. & Momen, S. (2023). Artificial Intelligence's Development and Challenges in Scientific Writing. *Egyptian Journal of Agricultural Research*, 101(3):714-717.



- Free Software Foundation. 2009. GNU Operating System. Retrieved from <http://www.gnu.org/gnu/gnu history.html>.
- Gupta, D. (2018). Adopting Free and Open-Source Software (FOSS) in Education. *i-manager's Journal of Education and Technology*, 14(4), 53-60.
- Hanaysha, J. R., Shriedeh, F. B. & In'airat, M. (2023). Impact of classroom environment, teacher competency, information and communication technology resources, and university facilities on student engagement and academic performance. *International Journal of Information Management*. Data Insights, 3: 100188.
- Hettige, S., Dasanayaka, E. & Ediriweera, D. S. (2022). Student usage of open educational resources and social media at a Sri Lanka Medical School. *BMC medical education*, 22: 1-11.
- Jereb, E. & Urh, M. (2024). The Use of Artificial Intelligence among Students in Higher Education. *Organizacija*, 57(4), 333-345.
- Kang, K. A., Kim, S. J. and Kang, S. R. (2022). Elementary school students' awareness of the use of artificial intelligence chatbots in violence prevention education in South Korea: a descriptive study. *Child Health Nursing Research*, 28(4), 291.
- Khanchandani, V. (2019). Awareness and Use of Reference Management Tools @ Indian Institute of Technology Delhi (IIT Delhi), Proceedings of The International Conference, 3 DLA - SRFLIS Summit 2019 Digital Age Strategies in Information Management for Sustainable Librarianship, Satija Research Foundation for Library and Information Science
- Kumar, D., Dhull, K. N. S. (2023). A comprehensive analysis of circuit training: Assessing the benefits and drawbacks for diverse fitness goals. *Journal of Sports Science and Nutrition*, 4(1):190-193.
- Loana, D. T. M., Anhb, D. T. & Truong, N. X. (2024). Truong A Study on the Level of Awareness and Use of Artificial Intelligence Tools of Students at Viet - Hung Industry University. *International Journal of Research Publication and Reviews*, 5(5):1872-1878
- Melo, E., Silva, I., Costa, D. G., Viegas, C. M. D. & Barros, T. M. (2022). On the Use of eXplainable Artificial Intelligence to Evaluate School Dropout. *Educ. Sci.*, 12:845.
- Monika, M., Divyavarsini, V. & Suganthan, C. (2023). A Survey on Analyzing the Effectiveness of AI Tools Among Research Scholars in Academic Writing and Publishing. *International Journal of Advance Research and Innovative Ideas in Education*. 9(6): 2395-4396.
- Musa, U., Mamuda, S. & Kamba, A. H. (2020). Assessment of Level of Awareness and Extent of Utilization of Innovative Instructional Strategies for Teaching Science in Secondary Schools in Kebbi State, Nigeria. *African Educational Research Journal*, 8(3), 491-498.
- Nara, K., Kumar, P., Rathee, R. & Kumar, J. (2022). The compatibility of running-based anaerobic sprint test and Wingate anaerobic test: a systematic review and meta-analysis. *Pedagogy of Physical Culture and Sports*, 26(2):134-143.
- Nayak, K. & Binjha, P. B. (2022). Student's Awareness of Free and Open-Source Software (FOSS) in Higher Education.
- Ocansey, S., Abu, E. K., Abraham, C. H., Owusu-Ansah, A., Acheampong, C., Mensah, F. & Ilechie, A. (2021). Socio-demographic factors modify awareness, knowledge, and perceived risk of glaucoma in rural and urban residents in Ghana: a population-based survey. *Therapeutic Advances in Ophthalmology*, 13: 2515841421998099.
- Popenici, S. A. D. & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research. Practice in Technology Enhanced Learning*. 12 (1).
- Rahman, M. & Atikuzzaman, M. (2024). Social media-based copyright awareness and knowledge-sharing practices among university students in Bangladesh. *Information Services and Use*, 44(3), 237-254.
- Santiago, J. R. C. S., Embang, S. I., Conlu, M. T. N., Acanto, R. B., Lausa, S. M., Ambojia, K. W. P. & Romasanta, J. K. N. (2023). Utilization of Writing Assistance Tools in Research in Selected Higher Learning Institutions in the Philippines: A Text Mining Analysis. *International Journal of Learning, Teaching and Educational Research*, 22(11), 259-284.
- Setiani, N., Aditya, B. R., Wijayanto, I. and Wijaya, A. (2021). A study on awareness of bibliographic management software for the academic writing activity in higher education. In *Journal of Physics: Conference Series*. 823, 012035. IOP Publishing.

- Shofiah, N. & Putera, Z. F. (2024). Examining the user experience of artificial intelligence tools in academic writing: The perceptions lecturers' practices.
- Shrestha, L., Joshi, B., & Kumar, A. (2021). Writing A Research Paper: A Guide. *Journal of Universal College of Medical Sciences*, 9(01):76-81.
- Singh, A. K., Mahawar, K. L., & Singh, V. (2022). Use and awareness of Reference Management Software among the Research Scholars of Central Universities in North India: A Survey. *Journal of Indian Library Association*, 58(2), 112-121
- Soni, K., Kumar, A., Singh & Roushan, R. (2024). Open -Source Plagiarism Checking Software: An Assessment of Awareness and Utility Among Social Science Research Scholars of Lalit Narayan Mithila University, Darbhanga, Bihar: A Study. 10, 36-41
- Syahnaz, M., Fithriani, R. (2023). Utilizing Artificial Intelligence based Paraphrasing Tool in EFL Writing Class: A Focus on Indonesian University Students' Perceptions. *Scope: Journal of English Language Teaching*, 7(2):210
- Tran, T. T. T. & Nguyen, H. B. (2022). The effects of paraphrasing on EFL students' academic writing. *Journal of Language and Linguistic Studies*, 18(1), 976-987.
- Tung, L. (2023). ChatGPT can write code. Now researchers say it's good at fixing bugs, too | ZDNET.
- Ventura, A. M. C & Lopez, L. S. (2024) . Unlocking the Future of Learning: Assessing Students' Awareness and Usage of AI Tools. *International Journal of Information and Education Technology*, 14(8).

**Disclaimer/Publisher's Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2025): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*  
<https://pr.sdiarticle5.com/review-history/130675>