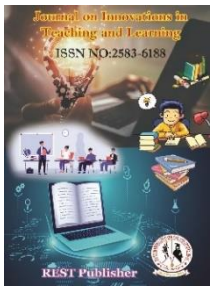
Journal on Innovations in Teaching and Learning

Vol: 4(3), September 2025

REST Publisher; ISSN: 2583 6188

Website: http://restpublisher.com/journals/jilt/

DOI: https://doi.org/10.46632/jitl/4/3/1



Unveiling Gender and Stream-Based Patterns in AI Tool Adoption among Prospective Postgraduate Teachers

Minha Kudukkil, Reesha K

University of Calicut, Kerala, India

*Corresponding author: minhaalif@gmail.com

Abstract: *The integration of Artificial Intelligence (AI) in education is reshaping teaching and learning processes, making it imperative to prepare future educators to effectively utilize these emerging technologies. This study investigates the use of AI tools among 200 prospective teachers from colleges affiliated with the University of Calicut, Kerala, with a particular emphasis on the opportunities and challenges associated with their adoption. The findings underscore the potential of AI to enhance learning outcomes, personalize instruction, and foster innovative pedagogical practices. However, the study also highlights barriers such as lack of training, ethical concerns, and resistance to change, which must be addressed for successful implementation. By examining both the benefits and challenges, this research contributes to the development of effective strategies for integrating AI into teacher education. The study emphasizes the importance of comprehensive training programs that equip future educators with the skills and confidence to harness AI responsibly and efficiently. Ultimately, the insights gained are expected to support the preparation of a new generation of tech-savvy educators capable of navigating and contributing to an increasingly technology-driven educational landscape.*

1. INTRODUCTION

Artificial intelligence (AI) tools have emerged as powerful resources in education, offering innovative solutions to enhance teaching and learning experiences. Prospective teachers are the future educators who will shape the learning experiences of upcoming generations. The awareness of AI tools among prospective teachers has far-reaching implications for teaching practice, professional development, and ethical considerations in education. Ultimately, by empowering prospective teachers to embrace AI tools, we can prepare them to meet the challenges and opportunities of 21st-century education and contribute to positive change in the field of education. Investigating their awareness and use of AI tools can shed light on their preparedness to incorporate such technologies into their teaching practices. This knowledge can help educational institutions tailor their teacher training programs to equip educators with the necessary skills for the digital age. Research by Zawacki-Richter et al. (2019) highlights that while AI is recognized for its potential benefits in education, there is a significant gap in awareness among educators regarding its practical applications. Prospective teachers often lack comprehensive knowledge about how AI can be effectively integrated into their teaching practices. This lack of awareness can impede the adoption of AI tools in educational settings. AI tools offer various benefits in teacher education, including personalized learning experiences, efficient assessment methods, and enhanced engagement through interactive content. A study by Holmes et al. (2021) found that AI can support differentiated instruction, allowing teachers to address diverse learning needs more effectively. For prospective teachers, understanding these benefits can foster a positive attitude towards AI adoption. Despite the potential benefits, integrating AI tools in teacher education faces several challenges. Research by Selwyn (2019) indicates that technical difficulties, lack of proper training, and concerns about data privacy are significant barriers. Prospective teachers often express apprehensions about the ethical implications of AI, particularly regarding data security and student privacy. The adoption of AI tools in education may also face barriers such as limited access to technology, concerns about job displacement, and apprehensions about privacy and data security. By examining prospective teachers' barriers regarding the use of AI tools, researchers can identify the challenges early on, paving the way for proactive strategies to address them and facilitate smoother integration of AI in educational settings. Effective teacher training programs are essential for promoting the use of AI tools in education. According to a study by Miao et al. (2021), professional development programs that include hands-on experiences with AI technologies can enhance teachers' confidence and competence in using these tools. For postgraduate students, incorporating AI training

into their curriculum can prepare them for future technological advancements in education. In today's rapidly evolving educational landscape, the integration of artificial intelligence (AI) tools is no longer a novelty but a necessity. As prospective teachers prepare to enter the teaching profession, the need to equip them with AI skills and knowledge has become increasingly critical. Understanding the use of AI tools can guide the development of strategies to promote effective technology integration in educational settings. This ensures that teachers are adequately equipped to leverage AI tools to enhance teaching effectiveness, personalize learning experiences, and improve student outcomes. Interpreting the teachers' AI awareness level is a foundation for developing educational programs related to AI. By understanding prospective teachers' knowledge regarding AI, tailored interventions and training initiatives can enhance educators' proficiency in effectively utilizing AI technologies within educational settings. By investigating these aspects, this study aims to provide insights into the current state of AI tool adoption among teacher candidates and identify potential areas for improvement in teacher training programs. Understanding the awareness levels of AI tools among M.Ed. students will provide valuable insights for educators, policymakers, and institutions. It will help identify gaps in current teacher education programs and highlight areas where additional training or resources may be needed. Ultimately, this research aimed to contribute to the development of a well-informed and technologically adept teaching workforce, capable of leveraging AI tools to enhance educational practices and student learning outcomes. This study may contribute to the development of more effective strategies for integrating AI into teacher education, fostering a generation of tech-savvy educators capable of harnessing the full potential of AI to enhance learning outcomes. The use of AI tools among prospective teachers at the postgraduate level is a critical area of research with significant implications for the future of education. While there are clear benefits to integrating AI in teacher education, addressing the challenges and providing comprehensive training are essential for successful adoption. Continued research and development in this field will be key to preparing the next generation of educators for a technologically advanced educational landscape.

2. MEAN DIFFERENCE ANALYSIS

Test of significance of difference between means undertaken to test whether significant difference exist in the mean scores for use of AI tools among prospective teachers at postgraduate level with respect to subsample gender and stream of study are given below. A critical ratio (t-value or F-value) equal to or exceeding 1.96 is considered significant at the 0.05 level, while a ratio of 2.58 or higher is considered significant at the 0.01 level.

Comparison of mean scores for use of AI tools among prospective teachers at postgraduate level based on Gender

For the investigation, whether there exists any significant difference in the mean scores for use of AI tools among prospective teachers at postgraduate level based on Gender; mean and standard deviation were calculated separately for the sub sample. Details are given in the table 9

TABLE 1. Data and Results of the Test of Significance of Difference between Mean Scores for Use of AI Tools based on Gender

Gender	N	Mean	Standard Deviation	Critical Ratio	Level of significance
Male	50	21.90	4.79	1.49	Not Significant
Female	150	20.66	5.19		

From table 9, it is clear that mean scores for use of AI tools among male students (M = 21.90, SD = 4.79) are higher than those of female students (M = 20.66, SD = 5.19, t= 1.49, p > 0.01). The obtained t value of 1.49 is lower than the critical values of 1.96 for the 0.05 significance level and 2.58 For the 0.01 significance level. Therefore, it can be concluded that there is no significant difference in the mean scores for the use of AI tools among prospective teachers at the postgraduate level based on gender.

Comparison of mean scores for use of AI tools among prospective teachers at postgraduate level based on Stream of study

For the investigation, whether there exists any significant difference in the mean scores for use of AI tools among prospective teachers at postgraduate level based on Stream of study; mean and standard deviation were calculated separately for the sub sample. Details are given in the table 10

TABLE 2. Data and Results of the Test of Significance of Difference between Mean Scores for Use of AI Tools based on Stream of Study

Stream of study	N	Mean	Standard Deviation	Critical Ratio	Level of significance
Science	79	20.64	5.14	-.725	NS
Non-Science	121	21.18	5.10		

From table 10, it is clear that mean scores for use of AI tools among non-science students (M = 21.18, SD = 5.10) are higher than those of science students (M = 20.64, SD = 5.14, t= .725, p > 0.01). The obtained t value of .725 is lower than the critical values of 1.96 for the 0.05 significance level and 2.58 For the 0.01 significance level. Therefore, it can be concluded that there is no significant difference in the mean scores for the use of AI tools among prospective teachers at the postgraduate level based on stream of study

3. CONCLUSION

Most respondents actively use AI tools for academic tasks like note-taking, presentations, translation, summarizing, and understanding content. They find AI helpful for learning new concepts, enhancing teaching, and achieving academic goals. However, AI is less used for tasks like rubric creation, solving math problems, and making concept maps. Challenges include peer resistance, over-reliance, lack of training, concerns about accuracy, and limited instructor support. The study concluded that there is no significant difference in the use of AI tools among prospective teachers at postgraduate level based on gender, which indicates that there is no difference in the use of AI tools among male and female prospective postgraduate teachers There is no significant difference in the use of AI tools among prospective teachers at postgraduate level based on stream of study, which indicates that there is no difference in the use of AI tools among science and non-science prospective postgraduate teachers

REFERENCES

[1]. Alimi, A., Buraimoh, O., Aladesusi, G., & Omolafe, E. (2021). University students' awareness of, access to, and use of artificial intelligence for learning in Kwara State. *Indonesian Journal of Teaching in Science, 1*(2), 91–104. https://doi.org/10.17509/ijotis.v1i2.38014

[2]. Allen, M. J., & Yen, W. M. (1979). *Introduction to measurement theory*. Brooks/Cole Publishing Company. https://books.google.co.in/books?id=cgElAQAAIAAJ

[3]. Amadi-Iwai, P. S., Ubulom, W. J., & Okiridu, O. (2024). Awareness, competence and utilization of artificial intelligence for improved job performance by business educators in universities in south-south Nigeria. International Journal of Advanced Research and Learning, 3(1),65-77.

[4]. Anastasi, A. (1968). *Psychological testing*. Macmillan.

[5]. Arslan, K. (2020). Eğitimde yapay zeka ve uygulamaları. Batı Anadolu Eğitim Bilimleri Dergisi, 11(1), 71-88.

[6]. Barua, A. (2023, April 26). Top (FREE) AI tools for research and academic writing 2023 Article. LinkedIn. https://www.linkedin.com/pulse/top-free-ai-tools-research-academic-writing-2023-anik-barua/

[7]. Baumeister, R. F., & Leary, M. R. (1997). Writing narrative literature reviews. Review of General Psychology, 1(3), 311–320. https://doi.org/10.1037/1089-2680.1.3.311

[8]. Best, J. W., & Kahn, J. V. (1992). *Research in education* (6th ed.). Prentice-Hall of India**.**

[9]. Best, J. W., & Kahn, J. V. (1995). *Research in education* (7th ed.). Prentice-Hall of India.

[10]. Best, J. W., & Kahn, J. V. (2006). *Research in education* (10th ed.). Pearson/Allyn and Bacon. https://books.google.co.in/books?id=xgliQgAACAAJ

[11]. Blumenstyk, G. (2018, July 17). Can artificial intelligence make teaching more personal? The Chronicle of Higher Education. https://www.chronicle.com/article/can-artificial-intelligence/243023

[12]. Borge, N. (2016). Artificial intelligence to improve education challenges. International Journal of Advanced & Innovative Technology (IJAEIT), 2(6), 10–13. https://www.sciepub.com/reference/438515

[13]. Cambridge Dictionary. (1882). Cambridge University Press.

[14]. Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2018). Artificial intelligence trends in education: A narrative overview. Procedia Computer Science, 136, 16–24. https://doi.org/10.1016/j.procs.2018.08.233

[15]. Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. IEEE Access, 8, 75264–75278. https://doi.org/10.1109/ACCESS.2020.2988510

[16]. Cope, B., Kalantzis, M., & Searsmith, D. (2020). Artificial intelligence for education: Knowledge and its assessment in AI-enabled learning ecologies. Educational Philosophy and Theory, 53(12), 1229–1245. https://doi.org/10.1080/00131857.2020.1728732

[17]. **Dezhic, E. (**2017, June 14). *Artificial vs Natural Intelligence*. *Becoming Human: Artificial Intelligence Magazine*. Retrieved from https://becominghuman.ai/artificial-vs-natural-intelligence-82ccd056b212

[18]. Ebel, R. L. (1972). *Essentials of educational measurement* (2nd ed.). Prentice-Hall.

[19]. Eiriemiokhale, K. A., & Sulyman, A. S. (2023). Awareness and perceptions of artificial intelligence among librarians in university libraries in Kwara State, Nigeria. Indonesian Journal of Librarianship, 4 (2), 107-118.

[20]. Fahimirad, M. (2018). *Application of artificial intelligence in teaching and learning in educational contexts: A review of literature*. Proceedings of the 9th International Conference on Education and Educational Psychology (ICEEPSY 2018), Athens, Greece. Future Academy. https://doi.org/10.15405/epsbs.2019.01.02.38
[21]. Fakhar, H., Lamrabet, M., Echantoufi, N., El Khattabi, K., & Ajana, L. (2024). Artificial Intelligence from Teachers' Perspectives and Understanding: Moroccan Study. International Journal of Information and Education Technology, 14(6), 856–864. https://doi.org/10.18178/ijiet.2024.14.6.2111
[22]. Ferikoğlu, D. & Akgün, E. (2023). An investigation of teachers' artificial intelligence awareness: A scale development study. Malaysian Online Journal of Educational Technology, 10(3), 215-231. http://dx.doi.org/10.52380/mojet.2022.10.3.407
[23]. Fetzer, J. H. (1990). *Artificial intelligence: Its scope and limits*. Springer-Verlag.
[24]. Fitria, T. N. (2021). Artificial intelligence (AI) in education: Using AI tools for teaching and learning process. *Proceeding Seminar Nasional & Call For Papers*, 20 December 2021, 134–147. https://www.researchgate.net/publication/357447234
[25]. Gaber, S. A., Shahat, H. A., Alkhateeb, I. A., Al Hasan, S. A., Alqatam, M. A., Almughyirah, S. M., & Kamel, M. k. (2023). Faculty members' awareness of artificial intelligence and its relationship to technology acceptance and digital competencies at King Faisal University. International Journal of Learning, Teaching and Educational Research, 22(7), 473-496.
[26]. Garito, M. A. (1991). Artificial intelligence in education: evolution of the teaching—learning relationship. British journal of educational technology, 22(1), 41-47.
[27]. Garrett, H. E. (1979). *Statistics in psychology and education*. Vakils, Feffer and Simons Ltd.
[28]. Gartner, S., & Krašna, M. (2023). Artificial intelligence in education—Ethical framework. In Proceedings of the 2023 12th Mediterranean Conference on Embedded Computing (MECO). IEEE. https://doi.org/10.1109/meco58584.2023.10155012
[29]. Harris, M. C. (2011). *Artificial intelligence*. Cavendish Square Publishing LLC.
[30]. Henderson, P., Sinha, K., Angelard-Gontier, N., Ke, N. R., Fried, G., Lowe, R., & Pineau, J. (2018). Ethical challenges in data-driven dialogue systems. In Proceedings of the 2018 AAAI/ACM Conference on AI, Ethics, and Society (AIES-18) (pp. 123–129). New Orleans, LA, USA. https://doi.org/10.1145/3278721.3278772
[31]. Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial intelligence in education promises and implications for teaching and learning. Center for Curriculum Redesign.
[32]. Huang, L. (2023). Ethics of artificial intelligence in education: Student privacy and data protection. Science Insights Education Frontiers, 16(2), 2577–2587. https://doi.org/10.15354/sief.23.re202
[33]. Ikedinachi, A. P., Misra, S., Assibong, P. A., Olu-Owolabi, E. F., Maskeliūnas, R., and Damasevicius, R. (2019). Artificial intelligence, smart classrooms and online education in the 21st century: Implications for human development. Journal of Cases on
[34]. Information Technology (JCIT), 21(3), 66-79.
[35]. Joshi, A. V. (2020). Machine learning and artificial ıntelligence (pp. 53-61). Springer.
[36]. Kış, A. (2019). Eğitimde yapay zeka [Conference presentation abstract]. 14th International Education Management Congress, 197-201, İzmir, Türkiye.
[37]. Koos, S., & Wachsmann, S. (2023). Navigating the impact of ChatGPT/GPT-4 on legal academic examinations: Challenges, opportunities and recommendations. Media Iuris, 6(2), 255–270. https://doi.org/10.20473/mi.v6i2.45270
[38]. Kreps, G. L., & Neuhauser, L. (2013). Artificial intelligence and immediacy: designing health communication to personally engage consumers and providers. Patient Education and Counseling, 92(2), 205-210.
[39]. Kundariya, H. (Sept. 28, 2023). Best AI tools to empower your academic research. https://www.enago.com/academy/auth or/harikrishna12/
[40]. Lu, Y. (2019). Artificial intelligence: A survey on evolution, models, applications and future trends. *Journal of Management Analytics, 6*(1), 1–29. https://doi.org/10.1080/23270012.2019.1570365
[41]. Madu, C. O., & Musa, A. (2024). Lecturers' level of awareness of artificial intelligence as correlate of their digital competence at Federal University Wukari, Nigeria. Journal of Educational Research in Developing Areas, 5 (1), 59-67.
[42]. Marshall, C., & Rossman, G. B. (1999). *Designing qualitative research* (3rd ed.). Sage Publications, Inc.
[43]. McCarthy, J. (2007). From here to human-level AI. *Artificial Intelligence, 171*(18), 1174–1182. https://doi.org/10.1016/j.artint.2007.10.009
[44]. Miao, F., Holmes, W., Huang, R., & Zhang, H. (2021). AI and education: A guidance for policymakers. UNESCO Publishing. https://doi.org/10.54675/PCSP7350
[45]. Mikropoulos, T. A., & Natsis, A. (2011). Educational virtual environments: A ten-year review of empirical research (1999–2009). *Computers & Education, 56*(3), 769–780. https://doi.org/10.1016/j.compedu.2010.10.020
[46]. Munir, H., Vogel, B., & Jacobsson, A. (2022). Artificial intelligence and machine learning approaches in digital education: A systematic revision. Information, 13(4), 203. https://doi.org/10.3390/info13040203
[47]. Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.
[48]. Okonkwo, C. W., & Ade-Ibijola, A. (2021). Chatbots applications in education: A systematic review. *Computers and Education: Artificial Intelligence, 2*, 100033. https://doi.org/10.1016/j.caeai.2021.100033
[49]. Panagopoulou-Koutnatzi, F., Parpoula, C., & Karpouzis, K. (2023). Legal and ethical considerations regarding the use of ChatGPT in education. Computers and Society. https://doi.org/10.31235/osf.io/c5hf3
[50]. Pirim, A. (2006). Yapay zeka. Journal of Yaşar University, 1(1), 81-93.

[51]. Pokrivčáková, S. (2019). Preparing teachers for the application of AI-powered technologies in foreign language education. Journal of Language and Cultural Education, 7(3), 135–153. https://doi.org/10.2478/jolace-2019-0025
[52]. Remian, D. (2019). *Augmenting education: Ethical considerations for incorporating artificial intelligence in education* (Master's capstone project). University of Massachusetts Boston. https://scholarworks.umb.edu/instruction_capstone/52
[53]. Rizvi, M. (2023). Exploring the landscape of artificial intelligence in education: Challenges and opportunities. In 2023 5th International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA). IEEE. https://doi.org/10.1109/hora58378.2023.10156773
[54]. Roll, I., & Wylie, R. (2016). Evolution and revolution in artificial intelligence in education. *International Journal of Artificial Intelligence in Education, 26*(2), 582–599.
[55]. Russell, S. J., & Norvig, P. (2015). *Artificial intelligence: A modern approach* (3rd ed.). Pearson
[56]. Selwyn, N. (2019). Should robots replace teachers? AI and the future of education. Polity Press.
[57]. Slimi, Z., & Villarejo-Carballido, B. (2023). Navigating the ethical challenges of artificial intelligence in higher education: An analysis of seven global AI ethics policies. TEM Journal, 12(2), 590–602. https://doi.org/10.18421/tem122-02
[58]. Stefan, P. (2023). The critique of AI as a foundation for judicious use in higher education. Journal of Applied Learning and Teaching, 6(2). https://doi.org/10.37074/jalt.2023.6.2.4
[59]. Tang, K. H. D. (2024). Implications of artificial intelligence for teaching and learning. *Acta Pedagogia Asiana, 3*(2), 65–79.
[60]. Timms, M. J. (2016). Letting artificial intelligence in education out of the box: Educational cobots and smart classrooms. *International Journal of Artificial Intelligence in Education, 26*(2), 701–712. https://doi.org/10.1007/s40593-016-0095-y
[61]. Ulbert, S. (2017, May 2). The difference between artificial intelligence, general intelligence, and super intelligence. *Coresystems Blog*. https://www.coresystems.net/blog/the-difference-between-artifical-intelligenceartifical-general-intelligence-and-artifical-super-intelligence
[62]. UNESCO (2017). Data Revolution to measure equity in education for SDGs #CIES2017. Retrieved from http://www.iiep.unesco.org/en/data-revolution-measure-equity-educationsdgs-cies2017-3886
[63]. Uygun, D., Aktas¸ I., Duygulu, I., & Ko¨seer, N. (2024). Exploring teachers' artificial intelligence awareness. Advances in Mobile Learning Educational Research, 4(2), 1093-1104.
[64]. 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), 1136–1144.
[65]. Wolman, B. B. (1974). Dictionary of behavioral science. Van Nostrand Reinhold.
[66]. Xiao, Y., & Watson, M. (2019). Guidance on conducting a systematic literature review. Journal of Planning Education and Research, 39(1), 93–112.
[67]. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education–where are the educators?. International Journal of Educational Technology in Higher Education, 16(1), 1-27
[68]. Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., Liu, J.-B., Yuan, J., & Li, Y. (2021). A review of artificial intelligence (AI) in education from 2010 to 2020. *Complexity, 2021*, Article ID 8812542, 1–18. https://doi.org/10.1155/2021/8812542.
[69]. Zhang, K., & Aslan, A. B. (2021). AI technologies for education: Recent research & future directions. Computers and Education: Artificial Intelligence, 2(2), Article 100025. https://doi.org/10.1016/j.caeai.2021.100025.