Academic Research Journal of Science and Technology
- Academic Research Journal of Science and Technology
e-ISSN: 3048-9644
publications.ngmc.ac.in
https://doi.org/10.63300/acadresjscitechnol.v5i07.12

Exploring Artificial Intelligence Tool Usage Among Research Scholars: Insights from Selected Technical Universities in Tamil Nadu

R .Umamageswari[1,*], Dr. S. Vijayakumar[1]

[1] Research Scholar Research Department Library and Information science NGM College, Pollachi-642001, Tamil Nadu 1; Assistant Professor Research Department Library and, Information science NGM College ,Pollachi-642001 Tamil Nadu, India2

***Corresponding author:** R .Umamageswari, uma.library10680@gmail.com

ARTICLE INFO

Article history
Received: 1 November 2026
Revised: 15 November 2026
Accepted: 16 November 2026

Article ID
MS-2026-0024

Peer review
Double-blind peer review

Keywords
digital information literacy
artificial intelligence tools
research scholars
technology adoption
technical universities
Tamil Nadu

ABSTRACT

The rapid diffusion of artificial intelligence (AI) tools into academic research has made digital information literacy (DIL) a decisive competency for research scholars, yet little is known about how scholars in Indian technical universities actually acquire and apply this competency. This study examines the level of digital information literacy for AI tools among research scholars at ten technical universities in Tamil Nadu, India. Objectives were to assess awareness, usage patterns, competency, and barriers related to AI tools, and to identify institutional and demographic predictors of literacy. An explanatory sequential mixed-methods design was adopted, combining a structured questionnaire administered to 467 research scholars (stratified random sampling) with semi-structured interviews and focus group discussions. Quantitative data were analysed using descriptive and inferential statistics (t-test, ANOVA, correlation, regression) in SPSS, while qualitative data underwent thematic analysis. Results show high adoption (91.6%) but only moderate competency (M = 3.14/5), with formal training (Cohen's d = 0.93), discipline, and tool diversity as the strongest predictors, and knowledge/ethical gaps as the most severe barriers. The study concludes that awareness has outpaced critical and ethical competency, and recommends structured institutional training, faculty development, and clear AI-use policies to close this gap.

How to cite this article: R .Umamageswari, & Dr. S. Vijayakumar (2026). Exploring Artificial Intelligence Tool Usage Among Research Scholars: Insights from Selected Technical Universities in Tamil Nadu. *Academic Research Journal of Science and Technology*, *5*(07), 18. https://doi.org/10.63300/acadresjscitechnol.v5i07.12
Copyright and licence: © 2026 The Author(s). This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

1. INTRODUCTION

The twenty-first century has witnessed an unprecedented transformation in academic research, driven by the rapid integration of artificial intelligence (AI) into every stage of the research lifecycle, from literature discovery and data analysis to manuscript preparation. This transformation is not incremental; it represents a fundamental reimagining of how scholars locate, evaluate, synthesise, and ethically use digital information. In this evolving environment, Digital Information Literacy (DIL) has emerged as a critical competency that determines whether research scholars can work productively and responsibly alongside intelligent systems.

Tamil Nadu is one of India's premier technology and higher-education hubs, home to numerous technical universities such as Anna University, Vellore Institute of Technology (VIT), and SRM Institute of Science and Technology. The state's strong industry-academia linkages and active government digital-literacy initiatives make it an important, yet under-examined, context for understanding how research scholars adopt and apply AI tools. Despite the proliferation of AI applications, many scholars possess strong domain expertise but lack the comprehensive digital literacy needed to navigate an AI-enhanced research environment, creating technical, conceptual, evaluative, and ethical skill gaps.

Existing literature on AI and digital literacy has focused largely on undergraduate education, K-12 contexts, or faculty adoption in Western settings, leaving a gap in empirical understanding of research scholars in Indian technical universities. This study addresses that gap by investigating the level of digital information literacy for AI tools among research scholars in ten technical universities in Tamil Nadu.

The specific objectives of this study are to: (i) assess the awareness levels of AI tools among research scholars; (ii) examine usage patterns, frequency, and purposes of AI tool application; (iii) evaluate self-reported competency levels across research tasks; (iv) identify challenges and barriers to effective AI tool adoption; and (v) analyse the influence of demographic and institutional factors, including training and infrastructure, on digital information literacy outcomes.

2. Literature Review

A growing body of research has examined AI literacy across educational contexts. Sperling et al. (2024) conducted a scoping review of AI literacy in teacher education and found that frameworks developed primarily by computer scientists lack grounding in educational theory and often reduce ethics to technical configuration rather than professional judgement. Similarly, Ng et al. (2021), reviewing 30 peer-reviewed articles, identified four core dimensions of AI literacy - knowing, using, evaluating/creating, and ethical awareness - while noting that most studies emphasise lower-order knowledge acquisition over higher-order critical evaluation.

Studies focused on higher education and libraries provide further context. Scott-Branch et al. (2023) argued that academic librarians are uniquely positioned to lead AI literacy initiatives because of their existing expertise in information evaluation and critical thinking. Carroll and Borycz (2024) demonstrated that brief librarian-led interventions at a US university significantly increased science and engineering students' likelihood of using large language models for research, while Hervieux and Wheatley (2024) proposed a six-frame hierarchical AI literacy model for academic libraries based on interviews with librarians, although only 40% of respondents used any formal framework.

Instrument-development studies offer methodological guidance relevant to the present research. Ma and Chen (2024) validated a 15-item Artificial Intelligence Literacy Scale for Chinese college students across four dimensions - awareness, usage, evaluation, and ethics - while Hwang, Zhu, and Cui (2023) developed a 19-item AI-era digital literacy scale and found that technology-utilisation ability was the strongest predictor of perceived usefulness and ease of use. Aavakare (2019), applying an extended technology acceptance framework in Finnish universities, found that digital literacy strongly predicted intention to use digital technologies for learning, whereas information literacy alone did not.

Adoption-focused research highlights persistent barriers. Deja, Rak, and Bell (2021) showed that information literacy significantly predicts digital literacy, self-efficacy, and empowerment among academic faculty, positioning libraries as transformative agents of digital change. Mutia et al. (2024) found consistently positive librarian perceptions of AI's potential across Malaysia and Indonesia, but noted a reliance on perceptual rather than behavioural measures. In the Nigerian context, Bassey and Owushi (2023) and Ayanwale et al. (2024) reported that while librarians and pre-service teachers demonstrate awareness of AI, they continue to face resource, training, and expertise constraints.

Collectively, this literature reveals three consistent patterns: awareness of mainstream AI tools tends to be high, competency - particularly critical evaluation and ethical reasoning - lags behind, and structured training and institutional support are the strongest levers for improving digital literacy outcomes. However, few studies have empirically examined these dynamics among doctoral and postgraduate research scholars in Indian technical universities, a gap this study addresses

3. Methodology

This study employed an explanatory sequential mixed-methods design, grounded in the pragmatic research paradigm, comprising a dominant quantitative phase (QUAN) followed by a qualitative phase (qual) used to explain and elaborate statistical patterns.

Population and Sample

The target population comprised Ph.D. and M.Phil. research scholars enrolled at ten technical universities in Tamil Nadu during 2024-2025: Anna University, Karunya Institute of Science and Technology, B.S. Abdur Rahman Crescent Institute of Science and Technology, Kalasalingam Academy of Research and Education, Sathyabama Institute of Science and Technology, SRM Institute of Science and Technology, SASTRA, Vellore Institute of Technology, Karpagam Academy of Higher Education, and Amrita Vishwa Vidyapeetham. Using Yamane's (1967) formula with a 95% confidence level and 5% margin of error, a target sample of approximately 450-467 was determined and allocated proportionately across universities using stratified random sampling (stratified by university, department, and year of research).

Instrumentation

A structured questionnaire (81 items across demographic, awareness, usage, competency, barriers, and training-needs sections) was developed through literature review, expert panel review (content validity index = 0.87), and pilot testing with 40 scholars. The instrument demonstrated excellent reliability (overall Cronbach's alpha = 0.89-0.894) and good construct validity (KMO =

0.842; five factors explaining 68.4% of variance). Complementary qualitative instruments included a semi-structured interview guide (30 in-depth interviews) and a focus group discussion guide (four groups, 28 participants).

Data Collection and Analysis

Data were collected between August and December 2024 through online (Google Forms) and paper-based surveys, yielding 467-481 valid responses (response rates of 81-95%). Quantitative data were analysed in IBM SPSS using descriptive statistics, independent-samples t-tests, one-way ANOVA, Pearson correlation, chi-square tests, and hierarchical multiple regression. Qualitative data from interviews and focus groups (January-February 2025) were analysed using Braun and Clarke's (2006) six-phase thematic analysis in NVivo, with inter-coder reliability of Cohen's Kappa = 0.82. Ethical clearance was obtained from the Institutional Ethics Committee, and informed consent, confidentiality, and data-protection protocols were strictly followed throughout.

4. Analysis and Findings

Data from 467 valid respondents across the ten universities were analysed. The sample comprised 63.6% male and 35.3% female scholars (mean age = 28.4 years), with the largest disciplinary representation from Computer Science & Engineering (22.9%) and Electronics & Communication Engineering (18.4%).

Awareness of AI Tools

The overall AI Tool Awareness Score averaged 3.18 (SD = 0.84) on a 5-point scale, indicating moderate awareness. Awareness was highest for mainstream tools such as ChatGPT (95.5%) and Grammarly (92.7%) but considerably lower for specialised research platforms such as Scholarcy (23.1%) and Consensus AI (27.0%). One-way ANOVA revealed significant differences in awareness by discipline, $F(8, 458) = 10.64$, $p < .001$, eta squared = .157, with Computer Science & Engineering scholars (M = 3.68) significantly outscoring Civil Engineering scholars (M = 2.74). Awareness also declined significantly with age, $F(4, 462) = 4.92$, $p < .001$, while no significant gender difference was found, $t(460) = 1.24$, $p = .216$.

Usage Patterns and Adoption

AI tool adoption was widespread: 72.8% of scholars were active users and a further 18.8% occasional users, leaving only 8.4% non-users. Among users, the average scholar employed 3.4 different tools (SD = 1.8), predominantly for writing and grammar checking (86.7%) and literature search (81.2%), with far lower usage for statistical analysis (51.2%) and code generation (48.0%). Formal training was associated with significantly higher usage frequency (M = 4.41 vs. 4.01, $p < .001$) and tool diversity (M = 4.6 vs. 3.0, $p < .001$; Cohen's d = 0.91).

Competency and Digital Information Literacy

The overall Digital Information Literacy Score (DILS) averaged 3.14 (SD = 0.78), indicating moderate competency; only 31.9% of scholars achieved high or very high literacy. Component-level analysis showed strongest competency in Access and Retrieval (M = 3.46) but weakest in Ethical and Responsible Use (M = 2.68) and Evaluation/Validation of AI outputs (M = 2.86), revealing an awareness-ethics gap. Hierarchical regression showed that number of AI tools used (beta = .368), discipline (beta = .152), formal training (beta = .136), and usage frequency (beta = .112) were the strongest predictors of competency, jointly explaining 42.8% of variance, $F(7, 459) = 49.12$, $p < .001$.

Barriers and Institutional Support

The Barrier Severity Index averaged 2.92 (SD = 0.86). The most severe barriers were lack of structured training programmes (M = 3.84), uncertainty about appropriate AI use (M = 3.72), and academic-integrity concerns (M = 3.68), whereas cost-related barriers ranked lowest (M = 2.46), suggesting that free tools have largely democratised access. Only 40.3% of scholars had access to dedicated AI-training programmes, and access to such training correlated significantly with competency ($r = .38$, $p < .001$). Non-users reported significantly higher overall barriers (M = 3.38) than active users (M = 2.84), $F(2, 464) = 7.46$, $p < .001$.

Hypothesis Testing

Six of eight null hypotheses were rejected. Significant differences in digital literacy were found across universities, $F(9, 455) = 3.38$, $p = .001$, eta squared = .062, with VIT and SRM scholars showing higher literacy than Karpagam Academy. Demographic characteristics (notably discipline and age) significantly predicted competency (R squared = .210, $p < .001$). Formal training showed a strong positive association with competency (point-biserial $r = .42$, $p < .001$; $d = 0.93$), and usage frequency correlated strongly with perceived research productivity ($r = .54$, $p < .001$). Infrastructure availability significantly predicted literacy (R squared = .149, $p < .001$). However, year of research enrolment was not significantly associated with adoption status, chi square(6) = 3.96, $p = .682$, and no significant difference emerged between broad engineering and science disciplines, $t(463) = 0.92$, $p = .359$, indicating that granular disciplinary distinctions matter more than broad categorisation.

Digital Literacy Profiles

K-means cluster analysis identified four distinct scholar profiles: Advanced Users (23.2%), Moderate Users (37.0%, the largest segment), Emerging Users (31.6%), and Non-Adopters (8.2%), differing significantly across awareness, usage, competency, and barriers (all $p < .001$). This typology suggests that a one-size-fits-all training approach is unlikely to be effective and that interventions should be tailored to scholars' readiness levels.

Table 1. Summary of Key Descriptive Statistics (N = 467)

Construct	Mean (SD)	Key Finding
AI Tool Awareness	3.18 (0.84)	Moderate; highest for mainstream tools
Usage Frequency	4.11 (0.97)	High; 78.5% use tools daily/weekly
Digital Information Literacy (Competency)	3.14 (0.78)	Moderate; weakest in ethics/evaluation
Barrier Severity	2.92 (0.86)	Moderate; training gaps most severe

5. Conclusion

This study set out to assess the level of digital information literacy for AI tools among research scholars at technical universities in Tamil Nadu. The findings reveal a scholarly population that has largely crossed the threshold of AI tool adoption - 91.6% report at least occasional use - yet has not attained corresponding depth of competency, particularly in critically evaluating AI outputs and applying ethical judgement. Awareness and usage are shaped strongly by discipline and age, while competency is most powerfully predicted by tool diversity, formal training, and institutional support rather than by demographic characteristics alone.

These results carry clear implications. Universities should move beyond ad hoc exposure to AI tools and institute structured, mandatory AI-literacy training embedded within research-scholar orientation and ongoing professional development, with particular attention to ethics, critical evaluation, and discipline-specific applications for fields such as Civil and Mechanical Engineering that currently lag behind computing-oriented disciplines. Clear institutional policies on acceptable use, attribution, and academic integrity are urgently needed, as is faculty development to enable supervisors to mentor scholars effectively in AI-enhanced research practice. Because the four identified literacy profiles - Advanced, Moderate, Emerging, and Non-Adopter - have distinct needs, tiered and targeted interventions are likely to be more effective than uniform training programmes.

In sum, the study contributes empirical, India-specific evidence to the global discourse on AI literacy in higher education and offers a practical, evidence-based foundation for policy and institutional action aimed at converting widespread AI adoption into sophisticated, ethically grounded digital information literacy among research scholars.

6. Limitations

This study is subject to several limitations. First, the cross-sectional design precludes causal inference regarding relationships between training, usage, and competency. Second, reliance on self-reported measures introduces potential social-desirability and self-assessment bias, as no objective performance-based testing of AI tool competency was conducted. Third, the sample was confined to ten technical universities in Tamil Nadu, limiting generalisability to other Indian states, non-technical institutions, or international contexts. Fourth, given the rapid evolution of AI technologies, findings regarding specific tools may quickly become outdated. Finally, while the mixed-methods design strengthens the study's validity, integration of quantitative and qualitative findings required researcher judgement that may not be fully replicable.

REFERENCES

Aavakare, M. (2019). Impact of digital literacy and information literacy on the intention to use digital technologies for learning: A study among university students and employees. In Proceedings of the European Conference on Information Systems.

Ayanwale, M. A., Adelana, O. P., Molefi, R. R., & Adeeko, O. (2024). Examining artificial intelligence literacy among pre-service teachers for future classrooms. Computers and Education Open, 5, 100171.

Bassey, B. A., & Owushi, E. E. (2023). Adoption of artificial intelligence in library and information science: A survey of librarians in Akwa Ibom and Rivers States, Nigeria. Library Philosophy and Practice.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101.

Carroll, A. J., & Borycz, J. (2024). Integrating large language models and generative artificial intelligence tools into information literacy instruction. Journal of Academic Librarianship, 50(4), 102872.

Chigwada, J. P. (2024). A framework for developing artificial intelligence digital literacy courses in academic libraries. Library Hi Tech News, 41(3), 12-17.

Deja, M., Rak, D., & Bell, B. (2021). Digital transformation readiness: Perspectives on academia's response to changing information environments. Journal of Documentation, 77(6), 1414-1436.

Hervieux, S., & Wheatley, A. (2024). Perceptions of artificial intelligence: A survey of academic librarians. Journal of Academic Librarianship, 50(1), 102836.

Hwang, Y., Zhu, R., & Cui, D. (2023). Digital literacy scale for college students in the artificial intelligence era: Development and validation. Education and Information Technologies, 28, 14547-14570.

Ma, S., & Chen, X. (2024). Development and validation of the Artificial Intelligence Literacy Scale for Chinese College Students (AILS-CCS). Frontiers in Psychology, 15, 1345678.

Mutia, R., Masrek, M. N., Baharuddin, M. F., Yuwinanto, H. P., & Atmi, R. T. (2024). Librarians' perceptions of artificial intelligence support for learning experience, lifelong learning, and digital literacy: A comparative study of Malaysia and Indonesia. Journal of Librarianship and Information Science.

Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. Computers and Education: Artificial Intelligence, 2, 100041.

Scott-Branch, S., Laws, R., & Terzi, T. (2023). Artificial intelligence, information, and digital literacy in higher education: The role of librarians. College & Research Libraries News, 84(9), 336-340.

Sperling, K., Stenberg, C.-J., McGrath, C., Akerfeldt, A., Heintz, F., & Stenliden, L. (2024). In search of artificial intelligence (AI) literacy in teacher education: A scoping review. Computers and Education Open, 6, 100169.

Yamane, T. (1967). Statistics: An introductory analysis (2nd ed.). Harper and Row.