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Digital Research Competency and AI Readiness among Teacher Trainees: Implications for Emerging Research Policies

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Abstract

The rapid integration of Artificial Intelligence (AI) into educational and research environments has transformed the nature of knowledge creation, dissemination, and utilization. Teacher trainees, as future educators and researchers, are expected to possess adequate digital research competencies and AI readiness to effectively engage with emerging academic technologies. The present study investigates the level of digital research competency and AI readiness among teacher trainees and examines their implications for emerging research policies in teacher education. A descriptive survey method was employed on a sample of 200 teacher trainees enrolled in B.Ed. and D.El.Ed. programmes. Data were collected through a self-developed Digital Research Competency and AI Readiness Scale. The findings revealed that the majority of teacher trainees demonstrated moderate to high levels of digital research competency, particularly in online literature search, information evaluation, and digital communication. However, comparatively lower competency was observed in advanced statistical software usage, research data management, and AI-assisted research applications. The study further indicated a positive relationship between digital research competency and AI readiness. The findings emphasize the need for policy frameworks that integrate AI literacy, digital research skills, ethical AI usage, and technology-enhanced research training within teacher education curricula. The study contributes to contemporary discussions on research capacity building and evidence-based policy development in higher education.

Keywords: Digital Research Competency, Artificial Intelligence Readiness, Teacher Trainees, Research Policy, Teacher Education, Digital Literacy.

Introduction

The twenty-first century has witnessed unprecedented technological advancements that have significantly transformed educational and research practices. Among these developments, Artificial Intelligence (AI) has emerged as one of the most influential innovations affecting knowledge generation, academic writing, data analysis, literature review, and decision-making processes. The emergence of AI-powered tools such as ChatGPT, Gemini, Copilot, Elicit, Research Rabbit, and various automated data analysis platforms has created new opportunities and challenges for researchers and educators alike.

Teacher education institutions play a critical role in preparing future educators who are expected to function effectively within increasingly digital and technology-driven environments. Consequently, teacher trainees must acquire not only pedagogical competencies but also the digital research skills necessary to access, evaluate, generate, and disseminate knowledge responsibly. Digital research competency has become an essential component of academic preparedness because contemporary research increasingly relies on digital databases, online collaboration platforms, reference management systems, statistical software, and AI-assisted tools.

Alongside digital competency, AI readiness has emerged as a crucial construct reflecting an individual's preparedness to understand, adopt, and ethically utilize AI technologies in academic and professional contexts. AI readiness encompasses technological awareness, positive attitudes toward AI adoption, confidence in using AI tools, and the ability to critically evaluate AI-generated outputs. As educational institutions worldwide begin incorporating AI into teaching-learning processes, understanding the preparedness of teacher trainees becomes increasingly important.

Emerging research policies across the globe emphasize digital transformation, open science, responsible AI use, academic integrity, and technology-enabled innovation. These policy shifts necessitate empirical evidence regarding the current competencies and readiness levels of prospective educators. In this context, the present study seeks to examine digital research competency and AI readiness among teacher trainees and explore their implications for future research policies in teacher education.

Need and Significance of the Study

Research ecosystems are rapidly evolving due to the widespread adoption of digital technologies and AI-driven applications. Educational institutions are increasingly encouraging students and researchers to use digital resources for academic inquiry and evidence-based decision-making. However, the effectiveness of such initiatives largely depends on users' competencies and readiness to engage with these technologies.

Teacher trainees represent the future teaching workforce and will play a significant role in shaping students' digital and research literacy. Insufficient digital research competency or inadequate AI preparedness may hinder their ability to engage in quality research practices and adopt innovative teaching strategies. Furthermore, concerns regarding ethical AI usage, misinformation, plagiarism, and data privacy highlight the necessity of assessing trainees' preparedness for responsible technology use.

The findings of this study may provide valuable insights for policymakers, curriculum developers, teacher educators, and institutional administrators. The results can support the development of targeted interventions, curriculum reforms, and policy frameworks aimed at strengthening research competencies and AI literacy among future educators.

Objectives of the Study

1. To assess the level of digital research competency among teacher trainees.
2. To examine the level of AI readiness among teacher trainees.
3. To analyze the relationship between digital research competency and AI readiness.
4. To identify areas requiring improvement for effective integration of AI in teacher education.
5. To suggest policy implications for strengthening research competency and AI preparedness.

Research Questions

1. What is the level of digital research competency among teacher trainees?
2. What is the level of AI readiness among teacher trainees?
3. Is there a significant relationship between digital research competency and AI readiness?
4. What policy measures can strengthen AI-enabled research practices among teacher trainees?

Hypothesis

H_0: There is no significant relationship between digital research competency and AI readiness among teacher trainees.

H_1: There is a significant positive relationship between digital research competency and AI readiness among teacher trainees.

Methodology

- **Research Design-** The present study employed the Descriptive Survey Method, which is considered one of the most appropriate approaches for investigating existing conditions, attitudes, competencies, perceptions, and behavioral tendencies within a specific population. The descriptive survey method enables the researcher to collect factual information regarding the current status of digital research competency and AI readiness among teacher trainees without manipulating any variables. Since the study aimed to assess the prevailing levels of digital research skills, awareness of artificial intelligence, and their interrelationship, the descriptive survey design was deemed suitable. This method facilitated the collection of quantitative data from a large sample and allowed for systematic analysis and interpretation of findings.

- **Population of the Study-** The population of the study comprised all teacher trainees enrolled in Bachelor of Education (B.Ed.) and Diploma in Elementary Education (D.El.Ed.) programmes in teacher education institutions affiliated with recognized universities and teacher training boards. These trainees represent prospective educators who are expected to engage in academic research activities and integrate emerging technologies into teaching-learning processes. The population was selected because teacher trainees constitute a crucial stakeholder group in educational transformation and policy implementation related to digital research and artificial intelligence.

- **Sample and Sampling Technique-** A sample of 200 teacher trainees was selected for the study using the Stratified Random Sampling Technique. The stratification was carried out to ensure adequate representation of trainees from different teacher education programmes.

The sample distribution was as follows:

Programme	Number of Respondents
B.Ed. Trainees	120
D.El.Ed. Trainees	80
Total	200

The stratified random sampling technique ensured that participants from both programmes were proportionately represented in the study, thereby enhancing the reliability and generalizability of the findings. Within each stratum, respondents were selected randomly to minimize sampling bias and ensure equal opportunity for participation.

- **Tool for Data Collection-** For collecting the required data, the researcher developed a standardized instrument entitled "Digital Research Competency and AI Readiness Scale (DRCAIRS)". The tool was specifically designed to assess the extent of digital research skills and preparedness for AI utilization among teacher trainees.

- **Procedure for Data Collection-** The researcher obtained prior permission from the heads of the selected teacher education institutions. The purpose of the study was clearly explained to the participants, and informed consent was obtained before data collection. The questionnaires were administered both through printed forms and online platforms. Respondents were assured that the information provided would remain confidential and would be used exclusively for academic research purposes. Adequate time was provided to complete the questionnaire, and completed responses were carefully scrutinized for completeness and accuracy before analysis.

- **Statistical Techniques Used for Analysis-** The collected data were tabulated, coded, and analyzed using appropriate statistical techniques. The following statistical measures were employed:

- **Frequency and Percentage-** Frequency and percentage analyses were used to classify teacher trainees according to different levels of digital research competency and AI readiness. These techniques facilitated the interpretation of categorical data and provided a clear understanding of response distributions.
- **Mean (M)-** The arithmetic mean was calculated to determine the average scores obtained by respondents on various dimensions of digital research competency and AI readiness. Mean scores helped identify areas of strength and weakness among teacher trainees.
- **Standard Deviation (SD)-** Standard deviation was computed to determine the variability and dispersion of responses around the mean. It provided insight into the consistency of respondents' perceptions and competencies.
- **Pearson Product-Moment Correlation Coefficient (r)-** Pearson's correlation coefficient was employed to examine the relationship between digital research competency and AI readiness. The coefficient helped determine the direction and strength of association between the two variables.
- **t-test-** The independent samples t-test was used to examine significant differences in digital research competency and AI readiness based on demographic variables such as gender and programme type (B.Ed. and D.El.Ed.). The t-test enabled comparison between group means and determination of statistical significance.

Delimitations of the Study

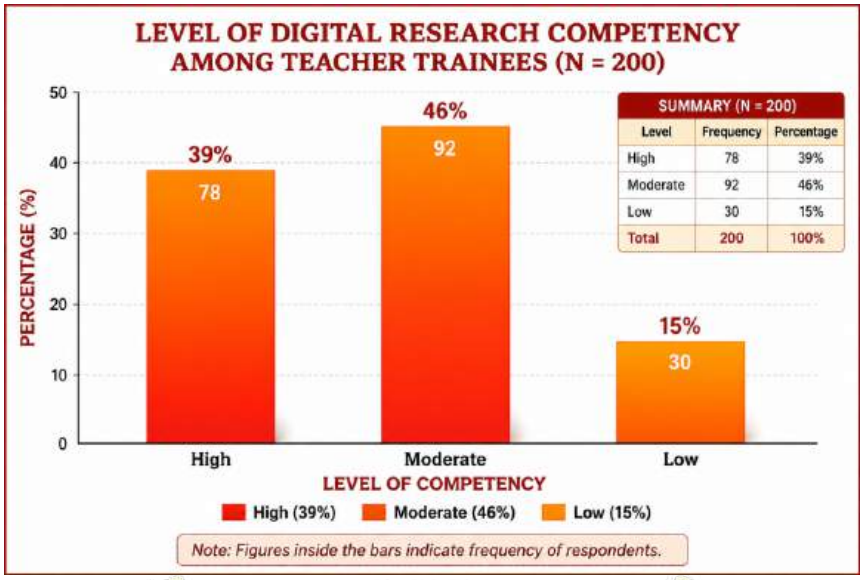
1. The study was confined to teacher trainees enrolled in B.Ed. and D.El.Ed. programmes.
2. The sample size was limited to 200 respondents.
3. The study focused only on digital research competency and AI readiness.
4. Data were collected through self-reported responses, which may involve subjective perceptions.
5. The findings are limited to the selected institutions and may not be generalized to all teacher education institutions.

Data Analysis and Interpretation

Table 1

Level of Digital Research Competency among Teacher Trainees (N=200)

Level	Frequency	Percentage
High	78	39%
Moderate	92	46%
Low	30	15%
Total	200	100%



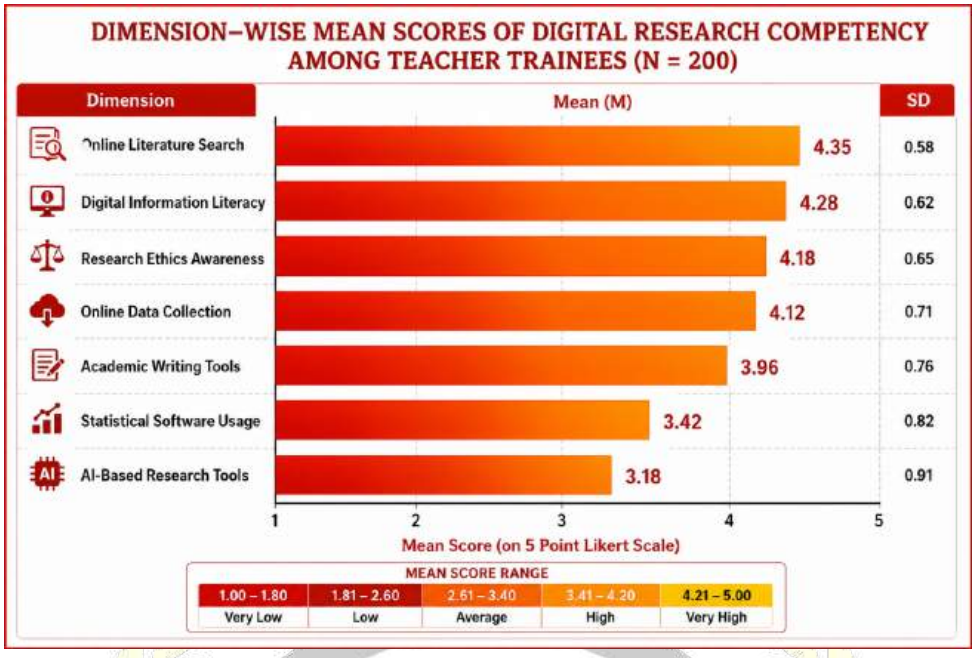
Interpretation

The findings indicate that 46% of teacher trainees possessed moderate digital research competency, while 39% demonstrated high competency. Only 15% exhibited low competency levels. The results suggest that most teacher trainees are reasonably familiar with digital research tools, though there remains considerable scope for advanced skill development.

Table 2

Dimensions of Digital Research Competency

Dimension	Mean	SD
Digital Information Literacy	4.28	0.62
Online Literature Search	4.35	0.58
Online Data Collection	4.12	0.71
Academic Writing Tools	3.96	0.76
Research Ethics Awareness	4.18	0.65
Statistical Software Usage	3.42	0.82
AI-Based Research Tools	3.18	0.91



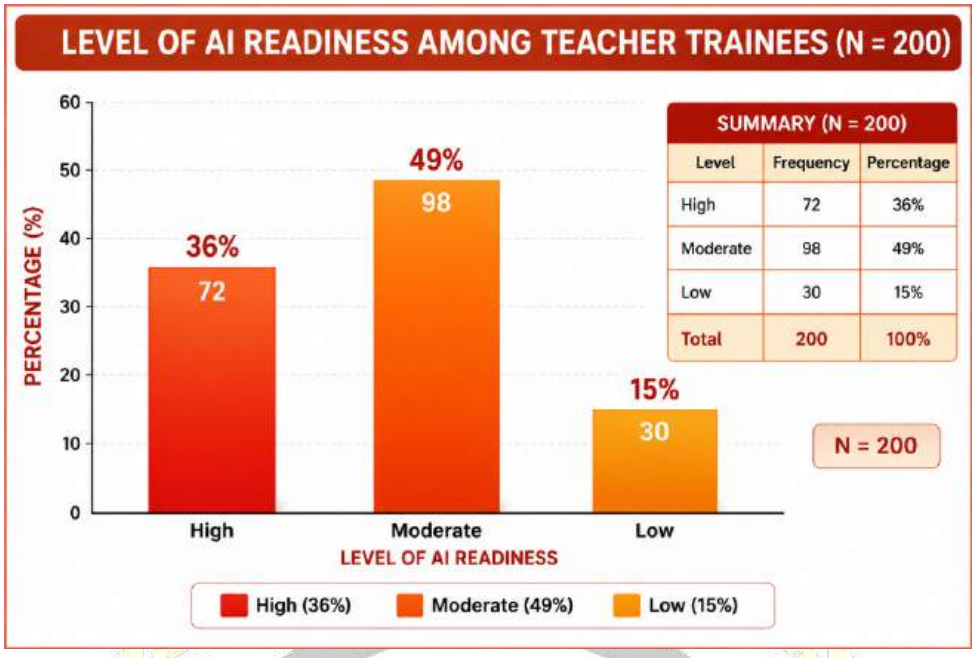
Interpretation

Teacher trainees showed relatively strong competencies in literature search and information literacy. However, lower mean scores for AI-based research tools and statistical software usage indicate limited exposure to advanced research technologies.

Table 3

Level of AI Readiness among Teacher Trainees

Level	Frequency	Percentage
High	72	36%
Moderate	98	49%
Low	30	15%
Total	200	100%



Interpretation

Nearly half of the respondents exhibited moderate AI readiness, suggesting awareness of AI technologies but limited confidence in their practical application. Only 36% demonstrated high readiness.

Table 4

Relationship between Digital Research Competency and AI Readiness

Variable	Mean	SD	Correlation (r)
Digital Research Competency	72.8	8.4	+0.76
AI Readiness	68.5	7.2	

Interpretation

The obtained correlation coefficient (r = +0.76) indicates a strong positive relationship between digital research competency and AI readiness. Teacher trainees possessing higher digital research competencies also tend to demonstrate greater preparedness for AI adoption.

Major Findings

1. Most teacher trainees exhibited moderate to high levels of digital research competency.
2. Online literature search and information literacy emerged as the strongest competency areas.
3. AI-based research tools and statistical software usage represented comparatively weaker dimensions.
4. The majority of respondents demonstrated moderate AI readiness.
5. A strong positive correlation (r = +0.76) was found between digital research competency and AI readiness.

6. Teacher trainees with stronger digital skills were more confident in adopting AI technologies for research purposes.

Educational Implications

1. Teacher education curricula should incorporate AI literacy and AI-assisted research training.
2. Research methodology courses should include practical exposure to digital research platforms and AI tools.
3. Institutions should organize workshops on ethical AI use, academic integrity, and responsible research practices.
4. Training programs should focus on statistical software, research analytics, and AI-supported academic writing.
5. Teacher education policies should integrate digital competency standards aligned with emerging global research policies.

Conclusion

The digital transformation of research and education has necessitated new competencies among future educators. The present study demonstrates that while teacher trainees possess satisfactory levels of digital research competency, significant gaps remain in advanced research technologies and AI-based applications. The positive association between digital competency and AI readiness suggests that strengthening digital research skills can facilitate greater acceptance and responsible utilization of AI technologies. As emerging research policies increasingly emphasize digital innovation, academic integrity, and technology-enabled research ecosystems, teacher education institutions must proactively equip future educators with the competencies required for effective participation in the evolving research landscape.

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