



A Study of the Level of Digital Literacy and Technological Skills of Teacher Trainees for Enhancing Contemporary Classroom Practices

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Abstract

The integration of digital technologies in education has become essential for enhancing teaching-learning process in contemporary classrooms. Teacher trainees are expected to possess adequate digital literacy and technological skills to effectively integrate technology into pedagogical practices. The present study aims to examine the level of digital literacy and technological skills among teacher trainees and their preparedness for enhancing contemporary classroom practices. Adopting a quantitative research design, the data will be collected from teacher trainees using a structured questionnaire made by the researcher. Descriptive statistical techniques will be employed to analyze the data. The findings will show the awareness of teacher trainees in using digital tools in education, as well as the questionnaire will record perceptions of teacher trainees on the institutional support and challenges in implementing digital practices in classrooms. The study aims to highlight the need for practice-oriented digital training within teacher education programs to bridge the gap between theoretical knowledge and classroom application.

Keywords: Digital Literacy, Teacher Trainees, Contemporary Classroom Practices

Introduction

In the twenty-first century, the rapid proliferation of digital technologies has fundamentally reshaped educational practices, demanding that teachers not only possess foundational subject knowledge but also the ability to integrate digital tools meaningfully into teaching and learning processes. Contemporary classrooms are increasingly characterised by blended and technology-enhanced pedagogies that support differentiated instruction, real-time feedback, learner autonomy, and collaborative knowledge construction (Tomczyk, 2024) [7]. Consequently, digital literacy is no longer an optional skill for educators, but rather a professional imperative that underpins effective teaching and learning in digitally mediated environments. The integration of digital technologies in education amplifies cognitive engagement, supports the implementation of learner-centred strategies, and aligns with larger educational goals such as equity, access, and lifelong learning (Lu *et al.*, 2025; UNICEF East Asia and Pacific Regional Office, 2024) [4, 8].

The concept of digital literacy extends beyond the mere ability to operate devices or software; it encompasses the capacity to *access, evaluate, create, and communicate*

information ethically and effectively using digital platforms (Tomczyk, 2024) [7]. This broader conception aligns closely with frameworks such as DigCompEdu and TPACK (Technological Pedagogical and Content Knowledge), which emphasise the fusion of content knowledge, pedagogical strategies, and technological proficiency as an integrated professional competence for educators (Rakisheva & Witt, 2023; as referenced in Lu *et al.*, 2025) [6, 4]. In teacher education contexts, digital literacy is thus conceptualised as a multi-dimensional construct involving digital technical skills, pedagogical knowledge, critical judgement, and the ethical use of information technologies to enhance constructive and inclusive learning experiences. Recent research underscores the centrality of digital literacy in teacher preparation. Pre-service and in-service teachers across global contexts consistently recognise the pedagogical value of integrating digital tools to foster student engagement, to facilitate formative assessment, and to support personalised learning pathways (Lu *et al.*, 2025) [4]. However, these studies also reveal persistent challenges related to infrastructure, institutional support, and the confidence of teachers to translate theoretical understanding into effective classroom application (Rakisheva & Witt,

2023; Lu *et al.*, 2025) [4, 6]. For example, while many pre-service teachers express positive attitudes toward digital technology's potential, actual instructional practices often remain constrained by limited access to resources, a lack of structured training, and contextual constraints such as curriculum rigidities and policy limitations (Lu *et al.*, 2025; Rakisheva & Witt, 2023) [4, 6]. These findings point to a critical gap between *digital awareness* and *digital integration competence*, suggesting that mere exposure to digital tools does not automatically translate into skilful pedagogical adoption.

Empirical studies have documented varying levels of digital literacy among teacher trainees, with implications for their readiness to implement technology-enhanced instruction. Quantitative analyses show that higher levels of digital literacy are significantly associated with greater confidence and readiness to integrate technology into pedagogical practices (Chakraborty *et al.*, 2025) [1]. Similarly, descriptive research has highlighted differential familiarity with common digital tools and limited knowledge of specialised educational technologies, indicating that many trainees are proficient with basic digital functionalities but less prepared to leverage complex learning management systems or digital assessment platforms (Mohalik, 2020) [5]. The implications of these findings are significant: without targeted professional development that emphasises both digital fluency and pedagogical integration strategies, teacher trainees may be ill-equipped to meet the evolving demands of contemporary classrooms.

In addition to digital tool proficiency, institutional support structures and teacher education curricula play a pivotal role in shaping trainees' digital preparedness. Studies suggest that curricula that embed practice-oriented digital training, scaffolded experiences with authentic digital tasks, and reflective opportunities for integrating technology contribute positively to the development of digital competence (Rakisheva & Witt, 2023) [6]. Conversely, traditional teacher education programmes that prioritise theoretical knowledge over experiential digital practice fail to bridge the gap between knowledge and application, perpetuating a disconnect between pre-service training and the realities of technology-rich classrooms (Rakisheva & Witt, 2023) [6]. Institutional factors such as access to updated hardware, ongoing mentoring, and collaborative learning communities have also been identified as critical enablers of digital competence, particularly in contexts where digital infrastructure is unevenly distributed.

The global pandemic further amplified the urgency of developing robust digital literacy among educators, as remote and hybrid modes of instruction became widespread. This shift revealed both the potential and the limitations of current teacher education approaches to digital learning. On one hand, the crisis accelerated digital transformation within educational systems and pushed many trainees to engage with online learning environments in substantive ways. On the other hand, sudden transitions exposed gaps in digital pedagogical strategies and highlighted the need for systematic preparation that integrates digital competencies across teacher education curricula rather than treating them as supplementary skills (UNICEF East Asia and Pacific Regional Office, 2024) [8]. Understanding trainees' awareness, proficiency, and perceptions of institutional

support and challenges will provide a foundation for designing targeted interventions that foster effective digital pedagogical practices. Such research not only contributes to the academic discourse on teacher digital competence but also offers practical implications for curriculum design, professional development, and educational policy aimed at preparing future educators for the digital age.

Review of the Related Literature

Rakisheva and Witt (2023) [6] conducted a systematic review with the objective of examining how digital competence is conceptualised and developed among pre-service teachers within teacher education programmes. Analysing empirical studies published across international contexts, the review focused on identifying dominant digital competence frameworks and pedagogical approaches used in teacher preparation. The findings revealed that most studies adopted established models such as DigCompEdu and TPACK; however, there was considerable variation in how these frameworks were operationalised in practice. The review highlighted that while pre-service teachers demonstrated moderate levels of basic digital skills, they lacked advanced pedagogical competence for integrating technology meaningfully into classroom instruction. The authors concluded that teacher education programmes require more practice-oriented, context-sensitive training models to bridge the gap between theoretical digital knowledge and classroom application.

Lu *et al.* (2025) [4] undertook a comprehensive systematic review to explore the relationship between teachers' digital competence and technology integration in education. The objective of the study was to synthesise empirical evidence on how digital competence influences instructional practices across different educational levels. The review analysed studies published in high-impact journals and found a strong positive association between teachers' digital competence and effective technology integration in teaching-learning processes. However, the findings also indicated that many teachers, particularly pre-service teachers, possessed limited pedagogical digital skills despite being confident users of basic technologies. The review emphasised the importance of institutional support, continuous professional development, and curriculum-embedded digital training to enhance teachers' readiness for contemporary classroom practices.

Gümüş *et al.* (2024) [2] conducted a systematic review to investigate the role of educational technology in teacher training, with a specific focus on competencies, skills, models, and instructional methods related to digital integration. The objective of the study was to identify core digital competencies required for teachers in technology-rich educational environments. The findings revealed that teacher education programmes largely emphasised technical skills, while pedagogical integration, digital assessment, and ethical use of technology received comparatively less attention. The review highlighted that effective digital competence development depends on experiential learning opportunities, collaborative practices, and reflective pedagogies. The authors recommended restructuring teacher education curricula to ensure balanced development of technical, pedagogical, and ethical dimensions of digital competence.

Li *et al.* (2023) [3] conducted a systematic literature review focusing on digital competence among pre-service and in-service teachers in China. The objective of the study was to analyse research trends, dominant themes, and challenges in digital competence development from 2010 to 2023. The review found that most studies were descriptive in nature and reported moderate levels of digital literacy among teachers. However, the findings revealed significant challenges related to insufficient institutional support, limited access to digital infrastructure, and inadequate training in pedagogical technology integration. The authors concluded that strengthening institutional frameworks and aligning teacher education curricula with digital competence standards are essential for improving teachers' preparedness for digital teaching practices.

Tomczyk (2024) [7] reviewed recent literature on digital literacy frameworks and their implications for teacher education, aiming to identify emerging trends and future directions in digital competence development. The review highlighted that digital literacy is increasingly viewed as a multidimensional construct encompassing technical skills, critical thinking, pedagogical application, and ethical awareness. The findings indicated that although teacher trainees generally display positive attitudes towards digital technologies, their ability to apply these tools effectively in classroom contexts remains limited. The study emphasised the need for systematic, practice-based digital training within teacher education programmes to ensure meaningful integration of technology into teaching–learning processes.

Objectives of the study

1. To assess the level of digital literacy among teacher trainees in relation to their ability to use digital tools for educational purposes.
2. To examine the technological skills of teacher trainees for integrating digital technologies into contemporary classroom teaching–learning practices.
3. To analyse the perceptions of teacher trainees regarding institutional support available for the use of digital technologies in teacher education programmes.
4. To identify the challenges faced by teacher trainees in implementing digital practices in classroom settings and the perceived gap between theoretical knowledge and practical application.

Research Questions

- RQ1:** What is the level of digital literacy among teacher trainees in relation to their ability to use digital tools for educational purposes?
- RQ2:** What technological skills do teacher trainees possess for integrating digital technologies into contemporary classroom teaching–learning practices?
- RQ3:** How do teacher trainees perceive the availability and adequacy of institutional support for the use of digital technologies in teacher education programmes?
- RQ4:** What challenges do teacher trainees face in implementing digital practices in classroom settings, and how do they perceive the gap between theoretical knowledge and practical application?

Methodology

1. **Research Design** The present study adopted a descriptive survey research design to examine digital literacy levels, technological skills, perceptions of institutional support and challenges faced by teacher trainees in integrating digital technologies into teaching–learning practices.
2. **Population of the Study** The population of the present study comprised of teacher trainees enrolled in recognized teacher education programme (B.Ed.), representing pre-service teachers undergoing formal professional preparation. This population included trainees from different year of study with varying levels of academic exposure to digital literacy.
3. **Sample and Sampling Technique** The sample for the study consisted of teacher trainees of B.Ed. programme from one central and one state university of Lucknow. The selection of participants was carried out using a purposive sampling technique, wherein teacher trainees who had completed or were currently enrolled in the teacher education programme were intentionally included in the study. This approach ensured that respondents possessed relevant academic exposure and experiential understanding necessary to provide informed responses aligned with the objectives of this study.
4. **Tool for Data Collection** Data were collected using a self-developed structured questionnaire prepared by the researcher using Google Forms. The questionnaire consisted of both demographic variables and Likert-scale items designed to capture pupil-teacher's perceptions regarding digital practices and challenges faced in its classroom implementation. The questionnaire was developed after reviewing related literature on digital competence of teacher-trainees. Items were framed by using a five-point Likert Scale, ranging from *Strongly Agree* to *Strongly Disagree*, allowing quantification of respondents' attitudes and perceptions.
5. **Data Collection Procedure** The questionnaire was administered online using Google Forms. The link to the form was shared with respondents through email and social media platforms. Participants were informed about the purpose of the study, and informed consent was obtained prior to data collection. Responses were collected over a specified period and were automatically recorded for analysis.
6. **Statistics and Data Analysis** The collected data were coded and analysed using appropriate descriptive statistical techniques. Descriptive statistics such as frequency, percentage, mean and standard deviation were used to summarize the data. These analyses were carried out using standard statistical software.

Analysis and Interpretation of the Data

Table 1: Demographic profile of the pupil-teachers (N= 106)

Variable	Category	Frequency (f)	Percentage (%)
Gender	Male	47	48.0
	Female	59	52.0
	Total	106	100.0

Table 1 presents the demographic profile of the pupil-teachers who participated in the study. The sample for this study comprised of 106 B.Ed. trainees from Two teacher Training institutes, in Lucknow, with a nearly balanced gender distribution, of 47 male and 59 female respondents.

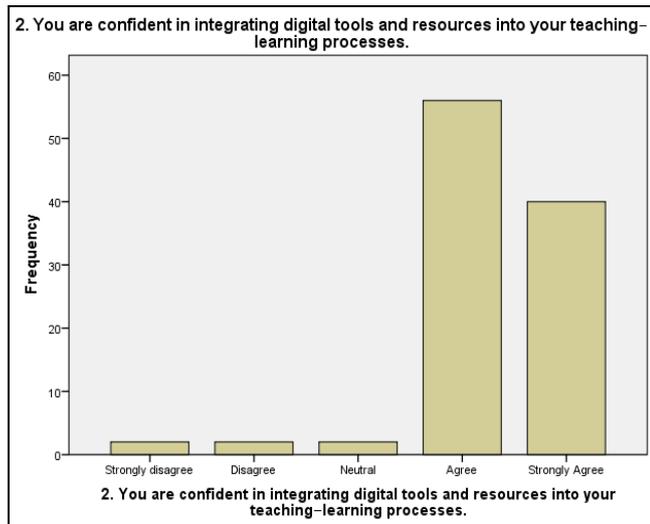


Fig 1: Digital Literacy and Frequency of Digital Tools Usage

Figure 1 presents the responses of pupil-teachers regarding their confidence in integrating digital tools and resources in their teaching-learning process, with 39.2% respondents reporting strong agreement and 54.9% reporting agreement.

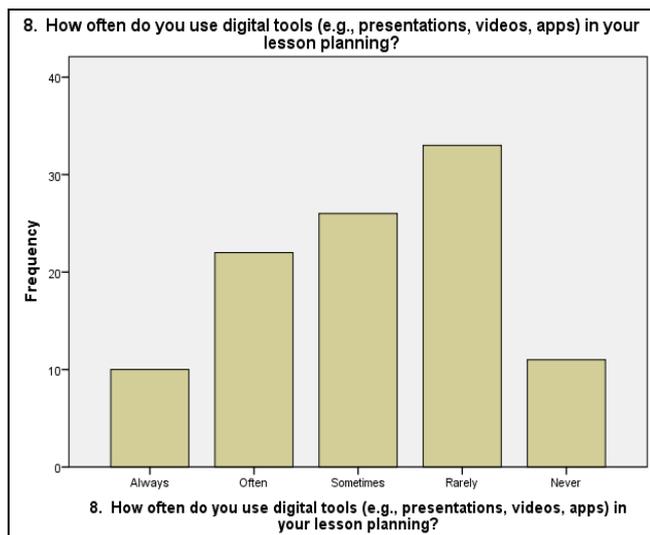


Fig 2: The results here suggest more varied pattern in the frequency of the usage of digital tools in real classroom environment

In contrast to the findings from figure 6.3, the results here suggest more varied pattern in the frequency of the usage of digital tools in real classroom environment. While 31.4% respondents reported using digital tools *often*, a significant number of respondents reported occasional or limited usage of digital tools and resources in the teaching-learning process, with 25.5% trainees reporting sometimes and 32.4% trainees saying rare usage of digital tools. Whereas, 10.8% respondents reporting that they have *never* used digital tools in practical classrooms.

Findings and Discussion

The major findings of the study, derived from the analysis of the responses collected, are as presented below:

1. The sample consisted a balanced gender representation, indicating sufficient gender diversity among respondents.
2. Most respondents demonstrated high confidence in integrating digital tools and resources into teaching, however, the frequency percentage of practical classroom use of digital tools was comparatively lower, indicating a gap between perceived competence and practical application.
3. Similarly, strong agreement was observed regarding the role of collaboration with teachers and experts in designing activities and activities, underscoring the importance of peer learning and expert collaboration.

Conclusion and Educational Implications

The present study sought to examine teacher trainees’ perceptions, preparedness and challenges related to implementation of digital pedagogical practices, the study found that implementation of digital tools in classroom is limited or not-present. On the other hand, exposure to orientation and training programs on digital pedagogical practices emerged as a significant factor influencing trainee teachers’ confidence and perceive professional ability. The study also underscores consistent challenges related to limited hands-on experience, insufficient training and lack of resources, these findings highlight the gap between theoretical understanding and practical application. Overall, the study provides the data which reinforces the need for a more structured and practical approach to teacher preparation. By focusing on pre-service teachers, the study contributes into the early stages of professional development of trainee teachers, emphasizing that, strengthening inclusive competence and digital literacy can enhance their professional readiness.

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