Digital Pedagogy in Teacher Education: A Survey of Prospective Teachers' Awareness, Attitudes, Readiness, And Innovative Teaching Practices

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***Abstract*—The integration of digital pedagogy in teacher education has become increasingly significant in response to evolving educational contexts and technology-mediated learning environments. Preparing prospective teachers to effectively use digital tools and adopt innovative teaching practices is essential for ensuring pedagogical relevance and instructional effectiveness in contemporary classroms. The present study aims to examine prospective teachers' awareness, attitudes, readiness, digital competence, and innovative teaching practices related to digital pedagogy, along with perceived institutional support and barriers.**

A survey method was employed to collect data from prospective teachers enrolled in teacher education programmes. A self-developed, structured questionnaire based on established theoretical frameworks, including the TPACK Model, Technology Acceptance Model (TAM), and Constructivist Learning Theory, was used for data collection. The instrument comprised multiple dimensions measuring awareness of digital pedagogy, attitudes towards technology integration, readiness and competence for digital teaching, inclination towards innovative pedagogical practices, and perceived constraints. Descriptive and inferential statistical techniques were applied to analyze the data, with selected demographic variables such as gender, age group, programme type, subject specialization, year/semester, and type of institution considered for comparative analysis.

The findings indicate varying levels of awareness, attitudes, and readiness among prospective teachers, highlighting both strengths and areas requiring targeted pedagogical support. Differences across certain demographic variables suggest that contextual and institutional factors play a significant role in shaping perceptions and preparedness for digital pedagogy. The study underscores the importance of systematically embedding digital pedagogy and innovation within teacher education curricula to enhance future teachers' preparedness for technology-enabled classrooms.

The study contributes to the existing literature by providing survey-based empirical evidence on multidimensional aspects of digital pedagogy in teacher education. The findings have implications for curriculum design, teacher preparation programmes, and policy initiatives aimed at strengthening digital pedagogical competence among prospective teachers.

***Index Terms*—Digital Pedagogy; Teacher Education; Prospective Teachers; Innovative Teaching Practices; Digital Readiness; Technology Integration**

I. INTRODUCTION

Traditional classroom practices in teacher education have been shaped by long-established pedagogical traditions that prioritize structured content delivery, systematic curriculum coverage, and the central role of the teacher as a knowledge mediator (Cuban, 1984; Lortie, 2002). In such classrooms, instruction has commonly been organized around lectures, prescribed texts, and uniform instructional sequences, ensuring coherence and standardization in teacher preparation programmes (Goodson, 2003). Pedagogical interactions in these settings have often emphasized explanation, demonstration, and repetition as key strategies for conceptual clarity and content mastery (Alexander, 2008). While these approaches have contributed to disciplinary grounding and classroom management skills, opportunities for learner autonomy, exploratory learning, and flexible instructional design have remained relatively limited (Darling-Hammond & Bransford, 2005). Engagement within traditional teacher education classrooms has therefore tended to focus more on listening, note-

taking, and examination-oriented preparation, with fewer avenues for interactive or technology-supported learning experiences (Entwistle, 2009; Biggs & Tang, 2011). The restrained integration of digital tools and innovative pedagogic practices in such settings reflects the historical context in which these models evolved, prior to the widespread availability of educational technologies.

1.1. Background of Traditional Classroom Practices in Teacher Education

Traditional classroom practices in teacher education have evolved from well-established pedagogical models that emphasize structured instruction, curricular coherence, and the systematic transmission of disciplinary knowledge (Cuban, 1984; Goodson, 2003). In these settings, teaching–learning processes have largely been organized around lectures, prescribed texts, and sequenced instructional routines, positioning the teacher as a central facilitator of content and classroom organization (Alexander, 2008). Such practices have historically supported clarity of explanation, consistency in assessment, and the development of foundational teaching competencies among pre-service teachers (Darling-Hammond & Bransford, 2005). However, instructional engagement in these classrooms has often relied on listening, note-taking, and examination-oriented preparation, with comparatively fewer opportunities for interactive learning, collaborative inquiry, or pedagogical experimentation (Entwistle, 2009). The use of digital tools and innovative pedagogic strategies has remained limited within many conventional teacher education contexts, reflecting the historical conditions under which these practices were institutionalized, prior to the widespread integration of educational technologies (Cuban, 2001; Biggs & Tang, 2011).

1.2. Emergence of Digital Pedagogy and Innovative Teaching Approaches

The emergence of digital pedagogy marks a significant development in educational thought, shaped by advances in information and communication technologies and changing conceptions of teaching and learning (Koehler & Mishra, 2009). Digital pedagogy extends beyond the mere use of technological tools, encompassing pedagogical approaches that purposefully integrate digital resources to enhance learning design, interaction, and knowledge construction (Laurillard, 2012). Over the past two decades, the integration of ICT, learning management systems, online platforms, and multimedia resources has expanded instructional possibilities across teacher education programmes (Redecker, 2017). These developments have facilitated the growth of blended, online, and technology-supported learning environments, enabling flexible access to content, collaborative learning, and continuous feedback (Garrison & Vaughan, 2008). Digital pedagogy has also been associated with innovative teaching practices such as flipped classrooms, project-based learning, and technology-mediated assessment, which aim to promote deeper learning and learner participation (Bates, 2019). As a result, digital pedagogy is increasingly viewed as a catalyst for pedagogical innovation, reshaping instructional roles and redefining classroom engagement in contemporary teacher education contexts (OECD, 2020).

1.3. Transition from Teacher-Centered to Learner-Centered, Technology-Enabled Classrooms

Contemporary pedagogical discourse highlights a gradual transition from predominantly teacher-centered instructional models to learner-centered and technology-enabled classroom practices (Weimer, 2013). This shift reflects constructivist perspectives that emphasize active learning, social interaction, and learner autonomy in knowledge construction (Vygotsky, 1978; Jonassen, 1999). Digital tools have played a critical role in supporting this transition by enabling collaborative learning, peer interaction, and access to diverse learning resources beyond the classroom (Hrastinski, 2009). Technology-enabled environments allow learners to engage with content at their own pace, participate in discussion forums, and co-create knowledge through digital platforms, thereby expanding opportunities for meaningful engagement (Means et al., 2014). Such pedagogical transformations align with student-centered learning theories that prioritize participation, reflection, and contextual learning experiences (Prince, 2004). In teacher education, these shifts have important implications for classroom engagement, as prospective teachers are increasingly expected to experience and enact pedagogies that foster interaction, inquiry, and learner agency within

digitally mediated contexts (Darling-Hammond et al., 2017).

1.4. Rationale for Focusing on Prospective Teachers

Prospective teachers represent a critical group for understanding the evolving relationship between pedagogy and technology, as they are future practitioners who will shape classroom practices in diverse educational settings (Tondeur et al., 2012). Teacher education programmes play a formative role in developing pre-service teachers' pedagogical beliefs, instructional competencies, and professional identities (Loughran, 2006). Developing digital competence, positive attitudes, and pedagogical confidence during the training stage is therefore essential for meaningful integration of digital pedagogy in future classrooms (Instefjord & Munthe, 2017). Research suggests that teachers' early experiences with technology-rich learning environments significantly influence their willingness and ability to adopt innovative teaching practices later in their careers (Ertmer & Ottenbreit-Leftwich, 2010). By focusing on prospective teachers, the present study acknowledges their potential as agents of pedagogical change who can bridge traditional instructional practices with emerging digital approaches (Darling-Hammond, 2017). Understanding their engagement with digital pedagogy provides valuable insights into the effectiveness of teacher education programmes in preparing teachers for contemporary educational demands.

1.5. Need and Significance of Studying Engagement with Digital Pedagogy

Engagement is widely recognized as a key determinant of successful technology integration in educational contexts, influencing both instructional effectiveness and learning outcomes (Fredricks et al., 2004). In the context of digital pedagogy, engagement encompasses cognitive involvement, emotional orientation, and behavioral participation in technology-mediated learning experiences (Bond et al., 2020). Studying engagement among prospective teachers is particularly significant, as their levels of engagement reflect not only skill acquisition but also motivation, confidence, and pedagogical commitment to digital practices (Schindler et al., 2017). Insights into engagement with digital pedagogy can inform curriculum design, professional development initiatives, and institutional support mechanisms within teacher education programmes (Tondeur et al., 2018). Furthermore, such investigations contribute to policy-level discussions on teacher preparedness for digitally enriched classrooms, aligning teacher education with national and global educational reforms (OECD, 2019). Examining engagement thus holds practical and theoretical significance in enhancing teacher readiness for the demands of digital-age teaching and learning.

1.6. Research Gap

Although existing research has explored technology integration and digital competence among teachers, empirical studies focusing specifically on prospective teachers' engagement with digital pedagogy remain limited. Many studies emphasize isolated variables such as skill acquisition or technology use, with insufficient attention to multidimensional constructs including awareness, attitude, readiness, competence, institutional support, and perceived barriers. Additionally, context-specific, survey-based evidence within teacher education settings—particularly in developing and transitional educational contexts—is relatively scarce. This gap highlights the need for a comprehensive investigation that captures the complexity of prospective teachers' engagement with digital pedagogy.

1.7. Purpose of the Study

The purpose of the present study is to examine prospective teachers' engagement with digital pedagogy in teacher education programmes. Specifically, the study aims to analyze levels of awareness, attitudes, readiness, digital pedagogical competence, innovation in teaching practices, and perceived barriers. It also seeks to explore the influence of selected demographic variables on prospective teachers' engagement with digital pedagogy.

II. REVIEW OF RELATED LITERATURE

2.1. Digital Pedagogy in Teacher Education

Digital pedagogy has emerged as a significant conceptual and practical shift in contemporary education, particularly within teacher education programmes. It refers to the intentional integration of digital technologies with pedagogical principles to

design meaningful, interactive, and learner-centered teaching–learning experiences (Koehler & Mishra, 2009; Laurillard, 2012). Unlike technology use as an add-on, digital pedagogy emphasizes the alignment of instructional goals, content knowledge, learner needs, and digital tools to enhance educational outcomes (Redecker, 2017). In teacher education, digital pedagogy encompasses curriculum design, instructional strategies, assessment practices, and reflective teaching supported by digital resources (Darling-Hammond et al., 2017).

The scope of digital pedagogy in teacher education is broad and multidimensional. It includes the use of learning management systems, digital content repositories, online discussion forums, multimedia resources, virtual classrooms, and collaborative platforms that facilitate both synchronous and asynchronous learning (Garrison & Vaughan, 2008). Research indicates that digital pedagogy enables flexible access to learning materials, promotes self-directed learning, and supports diverse learning styles among pre-service teachers (Means et al., 2014). Furthermore, digital environments allow teacher educators to model innovative pedagogical practices, thereby influencing prospective teachers' instructional beliefs and classroom orientations (Tondeur et al., 2012).

Several studies highlight the role of digital pedagogy in enhancing teaching–learning processes by fostering interaction, reflection, and higher-order thinking (Schindler et al., 2017). Digital tools such as simulations, educational videos, interactive presentations, and online assessments support conceptual clarity and pedagogical experimentation in teacher education contexts (Bates, 2019). Additionally, digital pedagogy facilitates formative assessment and timely feedback, enabling learners to monitor their progress and engage more deeply with instructional content (Nicol & Macfarlane-Dick, 2006). However, the effectiveness of digital pedagogy depends largely on teachers' pedagogical competence, attitudes, and institutional support structures (Ertmer & Ottenbreit-Leftwich, 2010).

In recent years, global educational reforms have emphasized the integration of digital pedagogy in teacher education to prepare teachers for technology-rich classrooms (OECD, 2019). Teacher education institutions are increasingly expected to embed digital pedagogy within coursework and practicum experiences, ensuring that prospective teachers not only acquire technical skills but also develop pedagogical reasoning for technology integration (Instefjord & Munthe, 2017). Despite this emphasis, studies reveal variations in implementation quality, access to resources, and pedagogical alignment across institutions, suggesting the need for deeper investigation into engagement with digital pedagogy among prospective teachers.

2.2. Innovation in Teaching Practices

Innovation in teaching practices is widely associated with purposeful change aimed at improving teaching effectiveness, learner engagement, and educational relevance (Fullan, 2007). In educational contexts, innovation does not merely imply novelty but involves the thoughtful adoption of new ideas, methods, or tools that respond to evolving learner needs and societal demands (OECD, 2014). In teacher education, innovative teaching practices are critical for preparing future teachers to navigate complex classroom environments and adopt adaptive pedagogies (Darling-Hammond & Bransford, 2005).

The dimensions of innovation in teaching include instructional design, learning strategies, assessment methods, classroom interaction, and the integration of technology to support these processes (Zhu et al., 2019). Technology-driven pedagogical innovations have gained prominence due to advancements in digital infrastructure and increased accessibility to online platforms. Blended learning, which combines face-to-face instruction with online learning components, has been widely recognized for enhancing flexibility, learner engagement, and instructional effectiveness (Garrison & Vaughan, 2008). Studies indicate that blended learning environments support reflective learning, peer collaboration, and personalized instruction in teacher education programmes (Graham, 2013).

The flipped classroom model represents another significant innovation, wherein instructional content is delivered outside the classroom through digital media, while classroom time is devoted to discussion, problem-solving, and application-based activities (Bishop & Verleger, 2013). Research suggests that flipped classrooms promote active learning, increase student participation, and support deeper conceptual understanding among pre-service teachers (Lo & Hew, 2017). Similarly, project-based and inquiry-based

learning approaches supported by digital tools encourage collaborative learning and pedagogical creativity (Prince & Felder, 2006).

Emerging innovations also include AI-supported teaching practices, such as adaptive learning systems, automated feedback tools, and data-driven instructional decision-making (Holmes et al., 2019). In teacher education, AI-based tools have the potential to support personalized learning pathways, simulate classroom scenarios, and enhance reflective practice (Luckin et al., 2016). While these innovations offer promising opportunities, their effective implementation requires pedagogical clarity, ethical awareness, and adequate institutional support (Selwyn, 2019).

Literature indicates that innovative teaching practices are most effective when integrated within coherent pedagogical frameworks rather than implemented as isolated interventions (Koehler et al., 2014). Teacher educators play a crucial role in modeling innovation, as prospective teachers often draw upon their own learning experiences when shaping future classroom practices (Loughran, 2006). Consequently, understanding how prospective teachers engage with innovative, technology-driven pedagogies is essential for evaluating the impact of innovation in teacher education.

2.3. Prospective Teachers and Digital Competence

Digital competence has become a core component of teacher professionalism in contemporary education systems (European Commission, 2017). For prospective teachers, digital competence encompasses a combination of knowledge, skills, attitudes, and ethical awareness required to effectively integrate digital technologies into teaching–learning processes (Ferrari, 2013). Research consistently emphasizes that digital competence is not limited to technical proficiency but includes pedagogical understanding, critical evaluation of digital resources, and reflective practice (Koehler & Mishra, 2009).

Studies examining digital readiness among prospective teachers reveal varying levels of preparedness and confidence in using digital tools for instructional purposes (Instefjord & Munthe, 2017; Tondeur et al., 2018). While many pre-service teachers demonstrate familiarity with everyday digital technologies, their ability to apply these tools pedagogically remains uneven (Gudmundsdottir & Hatlevik, 2018). Attitudes towards digital pedagogy play a significant role in shaping engagement, as positive perceptions are associated with greater willingness to experiment with innovative teaching practices (Teo, 2011).

Several factors influence prospective teachers' engagement with digital pedagogy. Institutional support, including access to digital infrastructure, training opportunities, and supportive learning environments, has been identified as a critical determinant (Ertmer et al., 2012). Teacher educators' beliefs and modeling practices also significantly affect pre-service teachers' pedagogical orientations toward technology integration (Tondeur et al., 2012). Additionally, opportunities for hands-on practice, reflection, and collaborative learning contribute to the development of digital pedagogical competence (Krumsvik, 2014).

Research highlights the importance of integrating digital pedagogy across teacher education curricula rather than confining it to standalone technology courses (Kay, 2006). When digital pedagogy is embedded within subject-specific teaching methods and practicum experiences, prospective teachers are more likely to perceive its relevance and applicability (Darling-Hammond et al., 2017). However, challenges such as limited exposure to innovative practices, variability in mentor support during internships, and concerns about classroom management in technology-rich environments continue to influence engagement levels (Howard et al., 2021).

Overall, the literature underscores that prospective teachers' engagement with digital pedagogy is shaped by a complex interplay of individual, pedagogical, and institutional factors. Understanding these dimensions is essential for developing targeted interventions that enhance digital readiness and pedagogical innovation in teacher education.

2.4. Research Gap

Despite a growing body of literature on digital pedagogy, innovation in teaching, and teacher digital competence, several gaps remain evident. First, many studies focus broadly on in-service teachers or higher education students, with comparatively limited empirical attention to prospective teachers as a distinct group undergoing professional formation. Second, existing research often examines isolated variables

such as technology use or digital skills, without adequately addressing multidimensional engagement encompassing awareness, attitudes, readiness, competence, innovation, and perceived barriers.

Moreover, there is a lack of comprehensive, survey-based studies that capture prospective teachers' engagement with digital pedagogy within teacher education contexts, particularly in non-Western and developing educational settings. Context-specific evidence examining institutional support, demographic influences, and perceived challenges remains scarce. These limitations indicate the need for systematic empirical investigation that adopts a holistic framework to understand prospective teachers' engagement with digital pedagogy. Addressing this gap is essential for informing curriculum design, teacher preparation policies, and professional development strategies aimed at strengthening digital pedagogical practices in teacher education.

III. THEORETICAL FRAMEWORK

The present study is grounded in a multidisciplinary theoretical framework that draws upon established models and learning theories to explain prospective teachers' engagement with digital pedagogy and innovative teaching practices. Given the complex nature of technology integration in education, no single theory sufficiently captures the pedagogical, technological, and attitudinal dimensions involved. Therefore, this study adopts an integrative framework drawing primarily from the Technological Pedagogical Content Knowledge (TPACK) Model, the Technology Acceptance Model (TAM), and Constructivist Learning Theory. Together, these frameworks provide a robust conceptual basis for examining awareness, attitudes, readiness, competence, innovation, and perceived barriers related to digital pedagogy.

3.1. Technological Pedagogical Content Knowledge (TPACK) Model

The TPACK model, proposed by Koehler and Mishra (2009), extends Shulman's concept of pedagogical content knowledge by emphasizing the dynamic interplay between technology, pedagogy, and content knowledge. The model asserts that effective technology integration in teaching requires not only technical proficiency but also an understanding of how digital tools can be pedagogically aligned with subject content and learner needs. In the context of teacher education, TPACK provides a valuable framework for analyzing prospective teachers' digital pedagogical competence and instructional readiness.

Several studies highlight TPACK as a foundational model for understanding teachers' capacity to design technology-supported learning experiences (Koehler et al., 2014; Chai et al., 2013). For prospective teachers, the development of TPACK is particularly significant, as their pedagogical beliefs and instructional habits are still evolving. The present study draws upon the TPACK framework to conceptualize variables related to digital competence, instructional innovation, and pedagogical readiness, emphasizing that meaningful engagement with digital pedagogy requires integrated rather than fragmented knowledge domains.

3.2. Technology Acceptance Model (TAM)

The Technology Acceptance Model (Davis, 1989) provides a complementary perspective by focusing on users' perceptions and attitudes toward technology adoption. According to TAM, two key factors—perceived usefulness and perceived ease of use—significantly influence individuals' attitudes toward technology and their intention to use it. In educational settings, TAM has been widely applied to understand teachers' and students' acceptance of digital tools and instructional technologies (Teo, 2011).

In the present study, TAM is particularly relevant for examining prospective teachers' attitudes, willingness to adopt digital pedagogy, and perceived barriers to technology integration. Research suggests that even when digital infrastructure is available, negative perceptions or low confidence can hinder effective pedagogical use of technology (Ertmer & Ottenbreit-Leftwich, 2010). By incorporating TAM, the study acknowledges that engagement with digital pedagogy is influenced not only by competence but also by beliefs, perceptions, and motivational factors. This framework supports the inclusion of attitudinal and perceptual variables in the survey instrument.

3.3. Constructivist Learning Theory

Constructivist Learning Theory provides the pedagogical foundation for understanding the

instructional implications of digital pedagogy and innovation. Rooted in the works of Piaget (1973) and Vygotsky (1978), constructivism emphasizes learning as an active, social, and meaning-making process. Learners construct knowledge through interaction, collaboration, reflection, and engagement with authentic tasks rather than passive reception of information.

Digital pedagogy aligns closely with constructivist principles by enabling interactive learning environments, collaborative knowledge construction, and learner autonomy through digital tools and platforms (Jonassen et al., 2008). Technology-supported approaches such as blended learning, flipped classrooms, and project-based learning reflect constructivist assumptions about learning and engagement. In teacher education, constructivist theory underscores the importance of preparing prospective teachers to design learner-centered, technology-enabled classrooms. The present study draws upon constructivism to interpret engagement as a multidimensional construct encompassing cognitive, emotional, and behavioral involvement in digital pedagogical practices.

3.4. Relevance of the Framework to Digital Pedagogy and Innovation

The integration of TPACK, TAM, and Constructivist Learning Theory offers a comprehensive lens for examining prospective teachers' engagement with digital pedagogy. While TPACK addresses what teachers need to know, TAM explains why they may or may not adopt technology, and constructivism clarifies how technology can transform learning processes. Together, these frameworks justify the selection of key study variables such as awareness, attitude, readiness, competence, innovation, and perceived barriers. This integrated approach enables a holistic understanding of digital pedagogy as both a pedagogical practice and a process of professional development in teacher education.

3.5. Conceptual Model of the Study

Based on the integrated theoretical framework, the study proposes a conceptual model in which prospective teachers' engagement with digital pedagogy is treated as a multidimensional outcome influenced by several interrelated factors. Awareness of digital pedagogy serves as a foundational variable, shaping attitudes and readiness toward technology integration. Attitudes and readiness, in turn, influence digital competence and innovative teaching practices. Institutional support and perceived barriers act as contextual factors that may facilitate or constrain engagement. Selected demographic variables are examined to understand variations in engagement patterns. This conceptual model provides the analytical structure for the survey design and guides data interpretation in the study.

IV. OBJECTIVES OF THE STUDY

To examine prospective teachers' engagement with digital pedagogy

To explore perceptions towards innovative teaching practices

To assess readiness and self-perceived competence in using digital tools

To identify factors influencing the shift from traditional to innovative classrooms

V. RESEARCH HYPOTHESES

H_{01}: There will be no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy based on *gender*.

H_{02}: There will be no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy across *different age groups*.

H_{03}: There will be no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy with respect to the type of *teacher education programme.*

H_{04}: There will be no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy based on their main subject or *teaching discipline.*

H_{05}: There will be no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy across *different years or semesters of the teacher education programme.*

H_{06}: There is no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy based *on the type of institution.*

VI. RESEARCH METHODOLOGY

6.1. Research Design

The present study employed the descriptive survey method, which is suitable for collecting information about existing conditions, opinions, and practices of the respondents. This method helped in systematically gathering data from the selected sample using structured tools such as questionnaires. The collected data were analyzed to understand the current status of the research problem and to draw meaningful conclusions

6.2. Population and Sample

The population of the present study consisted of prospective teachers enrolled in teacher education programmes. These students represent future teaching professionals and are directly relevant to the objectives of the study. A sample of 306 prospective teachers was selected using an appropriate sampling technique.

6.3. Tool for Data Collection

Data were collected using a structured questionnaire based on a Likert-scale format. The questionnaire consisted of 40 items designed to assess various dimensions related to prospective teachers' preparedness and perceptions.

The dimensions included awareness (4 items), digital readiness (10 items), attitude (7 items), competence (11 items), innovation (4 items), institutional support (2 items), and barriers (2 items). Each item was rated on a Likert scale to measure the level of agreement of the respondents. The tool enabled systematic collection of quantitative data for analysis and interpretation.

6.4. Procedure of Data Collection

The data were collected through the administration of a structured questionnaire to prospective teachers enrolled in teacher education programmes. The questionnaire was distributed personally and through online platforms to ensure wider reach and adequate response. Clear instructions were provided to the respondents for accurate completion of the survey.

Ethical considerations were strictly followed during the data collection process. The purpose of the study was clearly explained to the participants, and their participation was voluntary. Confidentiality and anonymity of the respondents were ensured, and the collected data were used solely for research purposes.

6.5. Data Analysis Techniques:

In the present study, demographic characteristics of the respondents were analysed using descriptive statistics, specifically frequency and percentage distribution, whereas objective-wise hypothesis testing was conducted using inferential statistical techniques, including the independent samples *t*-test and one-way ANOVA, to examine significant differences across groups.

6.6. Demographic Profile of Respondents:

The demographic profile of the respondents was analysed to establish the background characteristics of the sample in the context of digital pedagogy in teacher education. Demographic variables including gender, age group, teacher education programme, teaching discipline, and semester or year of enrolment in the teacher education programme were examined using descriptive statistics, specifically frequency and percentage distribution. This analysis provides a structural overview of the sample composition and facilitates contextual interpretation of prospective teachers' awareness, attitudes, readiness, and engagement in innovative teaching practices related to digital pedagogy.

Gender-wise Distribution of Respondents

The gender-wise distribution of respondents was analysed using frequency and percentage to understand the representation of prospective teachers in the study. The results are presented in Table No.1.

Table No.1: Gender-wise Distribution of Respondents

Gender	Frequency	Percentage
Female	233	76.1%
Male	73	23.9%
Total	306	100.0%

Table No.1 presents the gender-wise distribution of the respondents. Out of the total sample of 306 prospective teachers, 233 (76.1%) were female, while 73 (23.9%) were male. This indicates that female respondents constitute the predominant proportion of the sample. The higher representation of female prospective teachers reflects the gender composition commonly observed in teacher education programmes. This distribution provides an important demographic context for analysing prospective teachers' awareness, attitudes, readiness, and innovative teaching practices related to digital pedagogy.

Age-wise Distribution of Respondents

The age-wise distribution of respondents was analysed using frequency and percentage to understand the age composition of prospective teachers included in the study. The results are presented in Table No. 2.

Table No.2: Age-wise Distribution of Respondents

Age Group	Frequency	Percentage
Below 20 Years	4	1.3%
20–22 Years	79	25.8%
23–25 Years	150	49.0%
Above 25 Years	73	23.9%
Total	306	100.0%

Interpretation:

Table No. 2 shows the age-wise distribution of the respondents. The majority of the prospective teachers, 150 (49.0%), belong to the age group of 23–25 years, followed by 79 (25.8%) in the 20–22 years age group and 73 (23.9%) above 25 years of age. A very small proportion of respondents, 4 (1.3%), were below 20 years. This indicates that most of the respondents fall within the typical age range of enrolment in teacher education programmes. The predominance of respondents in the 23–25 years age group provides an appropriate demographic basis for examining prospective teachers' awareness, attitudes, readiness, and innovative teaching practices related to digital pedagogy.

Type of Teacher Education Programme

The distribution of respondents across different teacher education programmes was analysed using frequency and percentage to understand the academic enrolment profile of the prospective teachers included in the study. The results are presented in Table No.3.

Table No.3: Type of Teacher Education Programme

Programme	Frequency	Percentage
B.Ed.	226	73.9%
BA B.Ed.	1	0.3%
M.Ed.	76	24.8%
ITEP	1	0.3%
Ph.D.	2	0.7%
Total	306	100.0%

Table No.3 indicates that the majority of respondents, 226 (73.9%), were enrolled in the B.Ed. programme, followed by 76 (24.8%) in the M.Ed. programme. A very small proportion of respondents belonged to BA B.Ed. (0.3%), ITEP (0.3%), and Ph.D (0.7%) programmes. This distribution shows that the sample is predominantly composed of undergraduate-level teacher education students, with moderate representation from postgraduate programmes. The dominance of B.Ed. students provides an important academic context for analysing prospective teachers' awareness, attitudes, readiness, and innovative teaching practices related to digital pedagogy.

Subject Specialization of Respondents

The subject specialization of the respondents was analysed using frequency and percentage distribution to understand the disciplinary background of the prospective teachers included in the study. The results are presented in Table No.4.

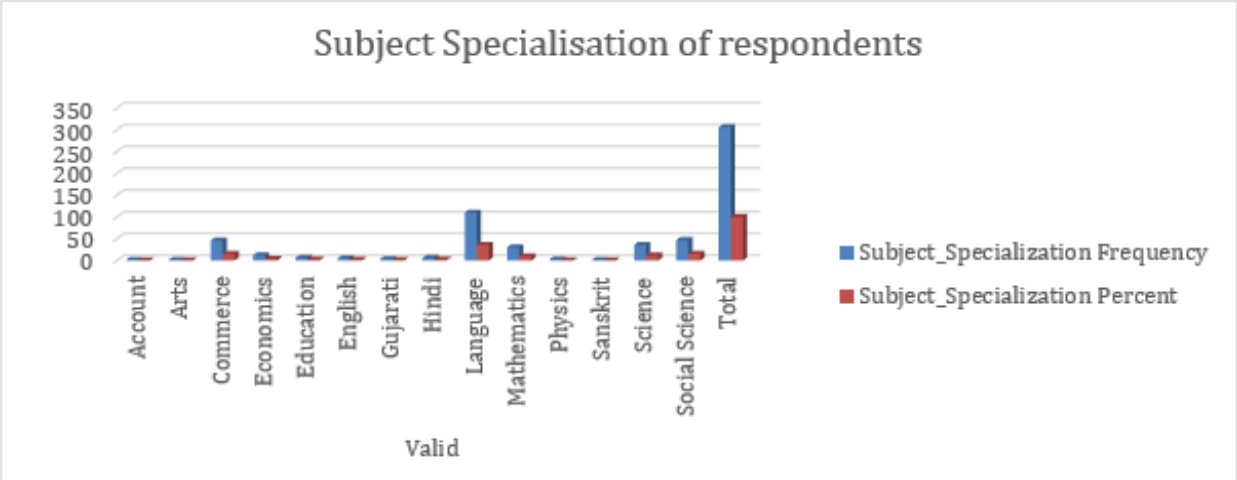

Figure No.1: Subject Specialization of Respondents

Figure No.1 presents the subject-wise distribution of the respondents. The majority of the prospective teachers, 110 (35.9%), belonged to Language specialization, followed by Social Science 47 (15.4%), Commerce 46 (15.0%), Science 36 (11.8%), and Mathematics 30 (9.8%). A comparatively smaller proportion of respondents represented disciplines such as Economics (3.9%), Education (2.0%), Hindi

Semester-wise Distribution of Respondents

The semester-wise distribution of respondents was analysed using frequency and percentage to understand the academic progression of prospective teachers enrolled in teacher education programmes. The results are presented in Table No.4.

Table No.4: Semester-wise Distribution of Respondents

Semester	Frequency	Percentage
First Semester	19	6.2%
Second Semester	165	53.9%
Fourth Semester	119	38.9%
Sixth Semester	3	1.0%
Total	306	100.0%

Table No.4 presents the semester-wise distribution of the respondents. The majority of the prospective teachers, 165 (53.9%), were enrolled in the second semester, followed by 119 (38.9%) in the fourth semester. A smaller proportion of respondents, 19 (6.2%), were in the first semester, while only 3 (1.0%) were in the sixth semester. This distribution indicates that most respondents were in the intermediate stages of their teacher education programme. The predominance of respondents in the second and fourth semesters suggests that the sample largely represents prospective teachers who have gained some level of exposure to pedagogical training, which is relevant for examining their awareness, attitudes, readiness, and innovative teaching practices related to digital pedagogy.

Type of Institution of Respondents

The type of institution in which the respondents were enrolled was analysed using frequency and percentage distribution to understand the institutional background of the prospective teachers included in the study. The results are presented in figure no.2.

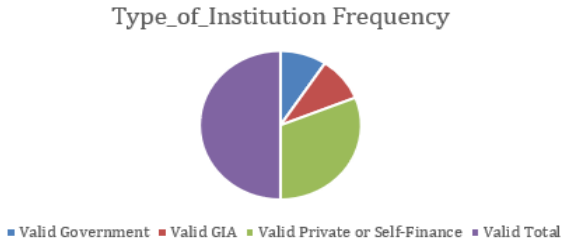

Figure No.2: Type of Institution of Respondents

Figure No.2 shows the distribution of respondents based on the type of institution. The majority of the prospective teachers, 190 (62.1%), were enrolled in private or self-financed institutions. This was followed by 59 (19.3%) respondents from grant-in-aid (GIA) institutions and 57 (18.6%) from government institutions. The findings indicate that a substantial proportion of the sample represents private or self-financed teacher education institutions. This institutional distribution provides an important

contextual basis for analysing prospective teachers' awareness, attitudes, readiness, and innovative teaching practices related to digital pedagogy, as institutional type may influence access to digital infrastructure and pedagogical exposure.

Medium of Instruction of Respondents:

The medium of instruction of the respondents was analysed using frequency and percentage distribution to understand the linguistic context of the prospective teachers' educational background. The results are presented in figure no.3.

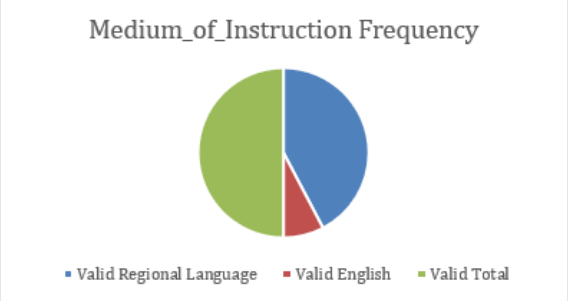

Figure No.3: Medium of Instruction of Respondents

Figure no. 3 presents the distribution of respondents based on their medium of instruction. The majority of the prospective teachers, 259 (84.6%), had regional language as their medium of instruction, whereas 47 (15.4%) respondents had English as their medium of instruction. This indicates that most respondents come from a regional language instructional background. The predominance of regional language medium respondents provides an important contextual perspective for examining their awareness, attitudes, readiness, and innovative teaching practices related to digital pedagogy, as medium of instruction may influence digital accessibility, content engagement, and pedagogical adaptability in technology-enabled learning environments.

Frequency of Technology Use among Respondents

The frequency of technology use among the respondents was analysed using frequency and percentage distribution to understand the extent of their engagement with digital technology in educational and related contexts. The results are presented in figure no.4.

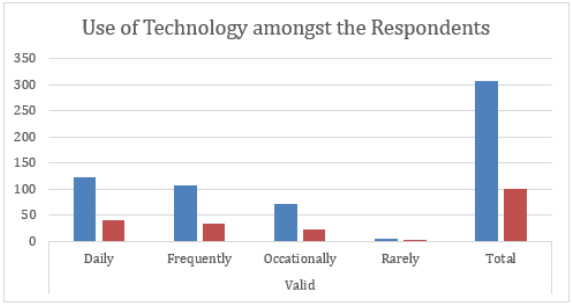

Figure No.4: Frequency of Technology Use among Respondents

Figure No. 4 presents the frequency of technology use among the respondents. A substantial proportion of prospective teachers, 122 (39.9%), reported using technology on a daily basis, followed by 107 (35.0%) who used technology frequently. Additionally, 72 (23.5%) respondents indicated occasional use of technology, while only 5 (1.6%) reported rare use. These findings suggest that the majority of prospective teachers are regular users of technology, indicating a relatively high level of exposure to digital tools. This frequent engagement with technology provides a favourable foundation for examining their awareness, attitudes, readiness, and innovative teaching practices related to digital pedagogy in teacher education.

Access to Digital Devices among Respondents

The access to digital devices among the respondents was analysed using frequency and percentage distribution to understand the availability of essential technological resources for engaging in digital pedagogy. The results are presented in Table No.5.

Table 5: Access to Digital Devices among Respondents

Access to Digital Device	Frequency	Percentage
Smartphone only	128	41.8%
Laptop/Desktop only	9	2.9%
Both Smartphone and Laptop/Desktop	169	55.2%
Total	306	100.0%

Table No.5 presents the distribution of respondents based on their access to digital devices. The majority of the prospective teachers, 169 (55.2%), reported having access to both smartphones and laptops/desktops, indicating a relatively higher level of digital accessibility. A considerable proportion, 128

(41.8%), had access only to smartphones, while a very small percentage, 9 (2.9%), had access exclusively to laptops or desktops. These findings suggest that smartphones are the most commonly accessible digital device among prospective teachers, while access to computers is comparatively limited. The availability of digital devices plays a crucial role in facilitating engagement with digital pedagogy and influences prospective teachers' awareness, readiness, and implementation of innovative technology-enabled teaching practices.

Internet Accessibility of Respondents

Internet accessibility among the respondents was analysed using frequency and percentage distribution to assess the quality and reliability of connectivity available to prospective teachers for engaging in digital pedagogy. The results are presented in Table No. 6.

Table No.6: Internet Accessibility of Respondents

Internet Accessibility	Frequency	Percentage
Limited	36	11.8%
Moderate	119	38.9%
Reliable and High-Speed	145	47.4%
Unreliable	6	2.0%
Total	306	100.0%

Table No.6 reveals that a majority of the respondents, 145 (47.4%), reported having reliable and high-speed internet access, followed by 119 (38.9%) who indicated moderate accessibility. A smaller proportion of respondents, 36 (11.8%), experienced limited internet access, while only 6 (2.0%) reported unreliable connectivity. These findings suggest that most prospective teachers have relatively stable internet access, which is a critical enabling factor for effective participation in digital pedagogy. However, the presence of respondents with limited or unreliable access highlights potential digital disparities that may influence levels of awareness, readiness, and implementation of innovative technology-integrated teaching practices.

6.6.2 Objective-wise Hypothesis Testing:

Following the descriptive analysis, objective-wise hypotheses were tested using appropriate inferential statistical techniques to examine significant differences among groups with respect to awareness, attitudes, readiness, and innovative teaching practices related to digital pedagogy. Independent samples *t*-test and one-way ANOVA were applied based on the nature of the demographic variables and study objectives. The results of hypothesis testing are presented in the subsequent sections.

H_{01}: There will be no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy based on gender.

An independent samples *t*-test was conducted to examine whether there was a statistically significant difference between male and female prospective teachers with respect to awareness, attitudes, readiness, digital competency, innovative teaching practices, perceived barriers, and institutional support related to digital pedagogy. Prior to interpreting the *t*-test results, Levene's Test for Equality of Variances was examined to verify the assumption of homogeneity of variances. Since the significance values of Levene's test were greater than 0.05 for all variables, equal variances were assumed for interpretation.

Table 7: Independent Samples *t*-Test Showing Gender-wise Differences in Awareness, Attitudes, Readiness, Digital Competency, Innovative Teaching Practices, Perceived Barriers, and Institutional Support Related to Digital Pedagogy

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)

Mean_AS	Equal variances assumed	0.350	0.555	2.060	304.000	0.040
	Equal variances not assumed			1.963	112.033	0.052
Mean_ATS	Equal variances assumed	0.018	0.894	1.501	304.000	0.134
	Equal variances not assumed			1.497	119.994	0.137
Mean_RS	Equal variances assumed	3.505	0.062	1.768	304.000	0.078
	Equal variances not assumed			1.660	109.683	0.100
Mean_DCS	Equal variances assumed	0.150	0.699	1.050	304.000	0.295
	Equal variances not assumed			1.019	115.014	0.311
Mean_ITPS	Equal variances assumed	1.999	0.158	0.473	304.000	0.636
	Equal variances not assumed			0.449	111.251	0.654
Mean_PBS	Equal variances assumed	2.037	0.155	-1.380	304.000	0.168
	Equal variances not assumed			-1.305	110.766	0.195
Mean_ISS	Equal variances assumed	1.292	0.257	3.178	304.000	0.002
	Equal variances not assumed			3.068	114.199	0.003

The results indicated that there was a statistically significant gender difference in Awareness Score (AS), t (304) = 2.060, p = 0.040, suggesting that male and female prospective teachers differed significantly in their level of awareness related to digital pedagogy. Similarly, a statistically significant difference was observed in Institutional Support Score (ISS), t (304) = 3.178, p = 0.002, indicating a significant variation between male and female respondents in their perception of institutional support for digital pedagogy.

However, no statistically significant gender differences were found in Attitude Score (ATS), t(304) = 1.501, p = 0.134; Readiness Score (RS), t(304) = 1.768, p = 0.078; Digital Competency Score (DCS), t(304) = 1.050, p = 0.295; Innovative Teaching Practices Score (ITPS), t(304) = 0.473, p = 0.636; and Perceived Barriers Score (PBS), t(304) = −1.380, p = 0.168, as the p-values were greater than the 0.05 level of significance.

Thus, the null hypothesis of no significant gender difference was rejected for Awareness and Institutional Support, while it was accepted for Attitudes, Readiness, Digital Competency, Innovative Teaching Practices, and Perceived Barriers. These findings suggest that gender influences certain aspects of digital pedagogy, particularly awareness and perception of institutional support, while other dimensions remain comparable across male and female prospective teachers.

H_{02}: There will be no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy across different age groups.

To test the above hypothesis, a one-way Analysis of Variance (ANOVA) was conducted to examine whether significant differences existed among different age groups with respect to the selected dimensions of digital pedagogy.

Table No. 8: One-Way ANOVA Showing Age-wise Differences in Awareness, Attitudes, Readiness, Digital Competence, Innovative Teaching Practices, Perceived Barriers, and Institutional Support towards Digital Pedagogy

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Mean_AS	Between Groups	1.910	3	0.637	0.875	0.454
	Within Groups	219.576	302	0.727		

	Total	221.485	305			
Mean_ATS	Between Groups	2.894	3	0.965	1.490	0.217
	Within Groups	195.565	302	0.648		
	Total	198.460	305			
Mean_RS	Between Groups	2.097	3	0.699	1.242	0.295
	Within Groups	170.014	302	0.563		
	Total	172.112	305			
Mean_DCS	Between Groups	3.243	3	1.081	1.333	0.264
	Within Groups	244.902	302	0.811		
	Total	248.145	305			
Mean_ITPS	Between Groups	3.737	3	1.246	1.311	0.271
	Within Groups	286.875	302	0.950		
	Total	290.612	305			
Mean_PBS	Between Groups	7.025	3	2.342	1.954	0.121
	Within Groups	362.004	302	1.199		
	Total	369.029	305			
Mean_ISS	Between Groups	5.336	3	1.779	1.071	0.362
	Within Groups	501.611	302	1.661		
	Total	506.948	305			

The ANOVA results revealed that there were no statistically significant differences across age groups for any of the study variables. Specifically, the results indicated non-significant differences in Awareness Score (AS), $F(3, 302) = 0.875$, $p = 0.454$; Attitude Score (ATS), $F(3, 302) = 1.490$, $p = 0.217$; Readiness Score (RS), $F(3, 302) = 1.242$, $p = 0.295$; Digital Competence Score (DCS), $F(3, 302) = 1.333$, $p = 0.264$; Innovative Teaching Practices Score (ITPS), $F(3, 302) = 1.311$, $p = 0.271$; Perceived Barriers Score (PBS), $F(3, 302) = 1.954$, $p = 0.121$; and Institutional Support Score (ISS), $F(3, 302) = 1.071$, $p = 0.362$.

Since the *p*-values for all variables were greater than the 0.05 level of significance, the null hypothesis (H_{02}) is accepted. This indicates that prospective teachers belonging to different age groups do not differ significantly in terms of their awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, or perception of institutional support related to digital pedagogy.

The findings suggest that age does not play a statistically significant role in influencing prospective teachers' engagement with digital pedagogy in the present study.

H_{03}: There will be no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy with respect to the type of teacher education programme.

To test this hypothesis, a one-way Analysis of Variance (ANOVA) was conducted to examine whether prospective teachers enrolled in different teacher education programmes differed significantly across the selected dimensions of digital pedagogy.

Table No. 9: One-Way ANOVA Showing Programme-wise Differences in Awareness, Attitudes, Readiness, Digital Competence, Innovative Teaching Practices, Perceived Barriers, and Institutional Support towards Digital Pedagogy

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Mean_AS	Between Groups	4.495	4	1.124	1.559	0.185
	Within Groups	216.990	301	0.721		

	Total	221.485	305			
Mean_ATS	Between Groups	6.192	4	1.548	2.423	0.048
	Within Groups	192.268	301	0.639		
	Total	198.460	305			
Mean_RS	Between Groups	1.922	4	0.481	0.850	0.495
	Within Groups	170.189	301	0.565		
	Total	172.112	305			
Mean_DCS	Between Groups	4.710	4	1.177	1.456	0.216
	Within Groups	243.436	301	0.809		
	Total	248.145	305			
Mean_ITPS	Between Groups	3.329	4	0.832	0.872	0.481
	Within Groups	287.283	301	0.954		
	Total	290.612	305			
Mean_PBS	Between Groups	7.170	4	1.793	1.491	0.205
	Within Groups	361.859	301	1.202		
	Total	369.029	305			
Mean_ISS	Between Groups	8.379	4	2.095	1.265	0.284
	Within Groups	498.569	301	1.656		
	Total	506.948	305			

The results of the ANOVA indicated that there was a statistically significant difference in Attitude Score (ATS) across different teacher education programmes, F (4, 301) = 2.423, p = 0.048, as the p-value was less than the 0.05 level of significance. This finding suggests that prospective teachers' attitudes towards digital pedagogy vary significantly depending on the type of teacher education programme in which they are enrolled.

However, no statistically significant differences were observed in Awareness Score (AS), F(4, 301) = 1.559, p = 0.185; Readiness Score (RS), F(4, 301) = 0.850, p = 0.495; Digital Competence Score (DCS), F(4, 301) = 1.456, p = 0.216; Innovative Teaching Practices Score (ITPS), F(4, 301) = 0.872, p = 0.481; Perceived Barriers Score (PBS), F(4, 301) = 1.491, p = 0.205; and Institutional Support Score (ISS), F(4, 301) = 1.265, p = 0.284, as their p-values were greater than 0.05.

Therefore, the null hypothesis (H_{03}) is partially rejected. It is rejected with respect to Attitudes towards digital pedagogy, and accepted for Awareness, Readiness, Digital Competence, Innovative Teaching Practices, Perceived Barriers, and Institutional Support.

These findings indicate that while the type of teacher education programme significantly influences prospective teachers' attitudes towards digital pedagogy, it does not significantly affect their awareness, readiness, digital competence, innovative teaching practices, perceived barriers, or perception of institutional support.

H_{04}: There will be no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy based on their main subject or teaching discipline.

To test the null hypothesis (H_{04}), a one-way ANOVA was conducted to examine whether prospective teachers differ significantly in their awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy based on their main subject or teaching discipline.

Table No.10: One-Way ANOVA Showing Differences in Prospective Teachers' Awareness, Attitudes, Readiness, Digital Competence, Innovative Teaching Practices, Perceived Barriers, and Institutional Support towards Digital Pedagogy Based on Main Subject/Teaching Discipline

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Mean_AS	Between Groups	11.953	13	0.919	1.281	0.223
	Within Groups	209.532	292	0.718		
	Total	221.485	305			
Mean_ATS	Between Groups	13.162	13	1.012	1.595	0.085
	Within Groups	185.298	292	0.635		
	Total	198.460	305			
Mean_RS	Between Groups	11.341	13	0.872	1.585	0.089
	Within Groups	160.770	292	0.551		
	Total	172.112	305			
Mean_DCS	Between Groups	13.351	13	1.027	1.277	0.226
	Within Groups	234.794	292	0.804		
	Total	248.145	305			
Mean_ITPS	Between Groups	22.184	13	1.706	1.856	0.035
	Within Groups	268.427	292	0.919		
	Total	290.612	305			
Mean_PBS	Between Groups	11.149	13	0.858	0.700	0.763
	Within Groups	357.880	292	1.226		
	Total	369.029	305			
Mean_ISS	Between Groups	34.258	13	2.635	1.628	0.077
	Within Groups	472.690	292	1.619		
	Total	506.948	305			

The results indicate that there is no significant difference in awareness ($F = 1.281$, $p = 0.223$), attitudes ($F = 1.595$, $p = 0.085$), readiness ($F = 1.585$, $p = 0.089$), digital competence ($F = 1.277$, $p = 0.226$), perceived barriers ($F = 0.700$, $p = 0.763$), and institutional support ($F = 1.628$, $p = 0.077$), as the obtained p-values are greater than the 0.05 level of significance. However, a significant difference was found in innovative teaching practices ($F = 1.856$, $p = 0.035$), as the p-value is less than 0.05. Therefore, the null hypothesis (H_{04}) is partially rejected. It can be concluded that prospective teachers differ significantly in their innovative teaching practices based on their teaching discipline, whereas their awareness, attitudes, readiness, digital competence, perceived barriers, and perception of institutional support towards digital pedagogy do not significantly vary across disciplines.

H_{05}: There will be no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy across different years or semesters of the teacher education programme.\

A one-way ANOVA was conducted to examine whether prospective teachers differ significantly in their awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy across different years or semesters of the teacher education programme.

Table 11: One-Way ANOVA Showing Differences in Prospective Teachers' Awareness, Attitudes, Readiness, Digital Competence, Innovative Teaching Practices, Perceived Barriers, and Institutional Support towards Digital Pedagogy Across Different Years/Semesters of the Teacher Education Programme.

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Mean_AS	Between Groups	1.151	3	0.384	0.526	0.665
	Within Groups	220.334	302	0.730		
	Total	221.485	305			
Mean_ATS	Between Groups	0.451	3	0.150	0.229	0.876
	Within Groups	198.009	302	0.656		
	Total	198.460	305			
Mean_RS	Between Groups	0.160	3	0.053	0.093	0.964
	Within Groups	171.952	302	0.569		
	Total	172.112	305			
Mean_DCS	Between Groups	0.529	3	0.176	0.215	0.886
	Within Groups	247.616	302	0.820		
	Total	248.145	305			
Mean_ITPS	Between Groups	0.353	3	0.118	0.123	0.947
	Within Groups	290.259	302	0.961		
	Total	290.612	305			
Mean_PBS	Between Groups	3.864	3	1.288	1.065	0.364
	Within Groups	365.165	302	1.209		
	Total	369.029	305			
Mean_ISS	Between Groups	0.329	3	0.110	0.065	0.978
	Within Groups	506.619	302	1.678		
	Total	506.948	305			

The results reveal that there is no statistically significant difference in awareness ($F = 0.526$, $p = 0.665$), attitudes ($F = 0.229$, $p = 0.876$), readiness ($F = 0.093$, $p = 0.964$), digital competence ($F = 0.215$, $p = 0.886$), innovative teaching practices ($F = 0.123$, $p = 0.947$), perceived barriers ($F = 1.065$, $p = 0.364$), and institutional support ($F = 0.065$, $p = 0.978$), as all the obtained p-values are greater than the 0.05 level of significance.

Therefore, the null hypothesis (H_{05}) is accepted. It can be concluded that prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and perception of institutional support towards digital pedagogy do not significantly differ across different years or semesters of the teacher education programme.

H_{06}: There is no significant difference in prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy based on the type of institution.

A one-way ANOVA was conducted to examine whether prospective teachers differ significantly in their awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and institutional support towards digital pedagogy based on the type of institution.

Table 12: One-Way ANOVA Showing Differences in Prospective Teachers' Awareness, Attitudes, Readiness, Digital Competence, Innovative Teaching Practices, Perceived Barriers, and Institutional Support towards Digital Pedagogy Based on Type of Institution

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Mean_AS	Between Groups	2.176	2	1.088	1.503	0.224
	Within Groups	219.309	303	0.724		
	Total	221.485	305			
Mean_ATS	Between Groups	0.415	2	0.207	0.317	0.728
	Within Groups	198.045	303	0.654		
	Total	198.460	305			
Mean_RS	Between Groups	2.361	2	1.181	2.107	0.123
	Within Groups	169.750	303	0.560		
	Total	172.112	305			
Mean_DCS	Between Groups	1.559	2	0.779	0.958	0.385
	Within Groups	246.586	303	0.814		
	Total	248.145	305			
Mean_ITPS	Between Groups	0.678	2	0.339	0.354	0.702
	Within Groups	289.934	303	0.957		
	Total	290.612	305			
Mean_PBS	Between Groups	1.329	2	0.664	0.547	0.579
	Within Groups	367.701	303	1.214		
	Total	369.029	305			
Mean_ISS	Between Groups	7.861	2	3.930	2.386	0.094
	Within Groups	499.087	303	1.647		
	Total	506.948	305			

The results indicate that there is no statistically significant difference in awareness ($F = 1.503$, $p = 0.224$), attitudes ($F = 0.317$, $p = 0.728$), readiness ($F = 2.107$, $p = 0.123$), digital competence ($F = 0.958$, $p = 0.385$), innovative teaching practices ($F = 0.354$, $p = 0.702$), perceived barriers ($F = 0.547$, $p = 0.579$), and institutional support ($F = 2.386$, $p = 0.094$), as all the p-values are greater than the 0.05 level of significance. Therefore, the null hypothesis (H_{06}) is accepted. It can be concluded that prospective teachers' awareness, attitudes, readiness, digital competence, innovative teaching practices, perceived barriers, and perception of institutional support towards digital pedagogy do not significantly differ based on the type of institution.

VII. RESULTS AND FINDINGS:

Following are the major findings of the study:

- Female-Dominated Sample Composition:

Out of 306 respondents, 233 (76.1%) were female and 73 (23.9%) were male, indicating a strong female representation in teacher education programmes.

- Majority in the Age Group of 23–25 Years:

Nearly half of the respondents, 150 (49.0%), belonged to the 23–25 years age group, followed by 79 (25.8%) in the 20–22 years category and 73 (23.9%) above 25 years, reflecting a typical enrolment age pattern.

- Predominance of B.Ed Students:

A substantial proportion of respondents, 226 (73.9%), were enrolled in the B.Ed programme, followed by 76 (24.8%) in M.Ed, indicating that the findings largely represent undergraduate-level prospective teachers.

- High Representation from Private Institutions:

Majority of respondents, 190 (62.1%), were from private/self-financed institutions, followed by 59 (19.3%) from GIA institutions and 57 (18.6%) from government institutions.

- High Frequency of Technology Use:

About 122 (39.9%) respondents reported daily use of technology and 107 (35.0%) reported frequent use, indicating strong exposure to digital tools.

- Substantial Access to Digital Devices and Internet:

More than half, 169 (55.2%), had access to both smartphone and laptop/desktop, while 145 (47.4%) reported reliable high-speed internet access, suggesting favourable digital infrastructure among respondents.

- Gender-based Differences (H_{01} – Partially Rejected):

The gender-based analysis (H_{01}) was partially rejected, as significant differences were found in Awareness ($t(304) = 2.060$, $p = 0.040$) and Institutional Support ($t(304) = 3.178$, $p = 0.002$). However, no significant differences were observed in Attitudes ($p = 0.134$), Readiness ($p = 0.078$), Digital Competence ($p = 0.295$), Innovative Teaching Practices ($p = 0.636$), and Perceived Barriers ($p = 0.168$). Thus, gender influences awareness and perception of institutional support, but not other dimensions.

- Age-wise Differences (H_{02} – Accepted):

No significant differences were observed across age groups in Awareness ($F = 0.875$, $p = 0.454$), Attitudes ($F = 1.490$, $p = 0.217$), Readiness ($F = 1.242$, $p = 0.295$), Digital Competence ($F = 1.333$, $p = 0.264$), Innovative Teaching Practices ($F = 1.311$, $p = 0.271$), Perceived Barriers ($F = 1.954$, $p = 0.121$), and Institutional Support ($F = 1.071$, $p = 0.362$). Age does not significantly influence digital pedagogy dimensions.

- Programme-wise Differences (H_{03} – Partially Rejected):

The analysis revealed a significant difference in Attitudes across programmes, $F(4, 301) = 2.423$, $p = 0.048$, indicating that the type of programme influences respondents' attitudes towards digital pedagogy. However, no significant differences were found in Awareness ($p = 0.185$), Readiness ($p = 0.495$), Digital Competence ($p = 0.216$), Innovative Teaching Practices ($p = 0.481$), Perceived Barriers ($p = 0.205$), and Institutional Support ($p = 0.284$). Thus, programme type affects attitudes but no other competencies.

- Discipline-wise Differences (H_{04} – Partially Rejected):

A significant difference was observed in Innovative Teaching Practices, $F = 1.856$, $p = 0.035$, suggesting that teaching discipline influences the adoption of innovative digital practices. However, no significant differences were found in Awareness ($p = 0.223$), Attitudes ($p = 0.085$), Readiness ($p = 0.089$), Digital Competence ($p = 0.226$), Perceived Barriers ($p = 0.763$), and Institutional Support ($p = 0.077$). Hence, discipline impacts innovative practices but no other dimensions.

- Semester-wise Differences (H_{05} – Accepted):

No significant differences across semesters in Awareness ($p = 0.665$), Attitudes ($p = 0.876$), Readiness ($p = 0.964$), Digital Competence ($p = 0.886$), Innovative Teaching Practices ($p = 0.947$), Perceived Barriers ($p = 0.364$), and Institutional Support ($p = 0.978$). Academic progression does not significantly affect digital pedagogy orientation.

- Institution-type Differences (H_{06} – Accepted):

No significant differences based on type of institution in Awareness ($p = 0.224$), Attitudes ($p = 0.728$), Readiness ($p = 0.123$), Digital Competence ($p = 0.385$), Innovative Teaching Practices ($p = 0.702$), Perceived Barriers ($p = 0.579$), and Institutional Support ($p = 0.094$). Institutional type does not significantly influence digital pedagogy dimensions.

Thus, the study concludes that prospective teachers generally demonstrate a consistent and positive orientation towards digital pedagogy, with limited demographic influence. Variations are observed only in specific dimensions such as awareness, attitudes, institutional support, and innovative teaching practices, suggesting the need for targeted interventions in these areas while maintaining overall standardized digital pedagogy training in teacher education programmes.

VIII. DISCUSSION

8.1. Awareness of Digital Pedagogy

The study indicates that prospective teachers possess a moderate to high level of awareness of digital pedagogy, supported by frequent use of technology and access to digital resources. A statistically significant difference was observed based on gender, while no significant differences were found across age, programme type, discipline, semester, or institutional type.

This suggests that awareness is widely distributed among prospective teachers, reflecting increasing exposure to digital environments. However, the observed gender difference indicates that awareness is still influenced by individual and experiential factors, pointing towards the need for more inclusive and equitable digital exposure in teacher education.

8.2. Attitudes towards Digital Pedagogy

The findings reveal that prospective teachers demonstrate a positive attitude towards digital pedagogy, indicating openness to technology integration in teaching–learning processes. A significant difference was found across teacher education programmes, whereas other demographic variables showed no significant influence.

This implies that while attitudes are generally favourable, they are shaped by programme-specific experiences and pedagogical exposure, highlighting the role of curriculum design in fostering positive perceptions towards digital pedagogy.

8.3. Readiness for Digital Teaching

Prospective teachers exhibit a moderate level of readiness for engaging in digital pedagogy. Despite widespread access to digital tools and regular technology usage, readiness does not significantly vary across demographic or academic variables.

This indicates that readiness is uniform but not fully developed, suggesting that exposure to technology alone does not ensure preparedness for pedagogical integration. Structured training and guided practice are therefore essential to strengthen readiness for digital teaching.

8.4. Digital Competence

The findings show that prospective teachers possess a moderate level of digital competence, primarily related to the functional use of digital tools. No significant differences were observed across any demographic variables.

This reflects that digital competence is consistently distributed, but may be limited to operational skills rather than deeper pedagogical application. It highlights the need to move beyond basic digital literacy towards integrated digital pedagogical competence.

8.5. Innovative Teaching Practices

The study reveals that prospective teachers are in the emerging stage of adopting innovative teaching practices using digital tools. A significant difference was found based on teaching discipline, while other variables showed no significant differences.

This indicates that innovation in digital pedagogy is discipline-sensitive, with certain subject areas being more conducive to adopting technology-based pedagogical innovations. It emphasizes the importance of discipline-specific pedagogical strategies for effective integration.

8.6. Perceived Barriers

Prospective teachers reported moderate levels of perceived barriers in implementing digital pedagogy. No significant differences were found across any demographic variables.

This suggests that challenges related to digital pedagogy are systemic and commonly experienced, rather than being limited to specific groups. It highlights the need for institutional and structural interventions to address these barriers.

8.7. Institutional Support

The findings indicate that perceptions of institutional support vary, with a significant gender-based difference observed. However, no significant differences were found across other variables.

This implies that while institutional support exists, its perceived effectiveness is uneven, reinforcing the importance of strengthening institutional frameworks, infrastructure, and support systems for digital pedagogy.

8.8. Synthesis of Findings in Relation to Objectives

In alignment with the objectives of the study, the findings collectively suggest that:

- Prospective teachers exhibit awareness and positive attitudes, forming a strong foundation for digital pedagogy.
- Readiness and digital competence are moderate, indicating the need for deeper pedagogical training.
- Innovative teaching practices are developing, but are influenced by disciplinary contexts.
- Perceived barriers persist across all groups, highlighting systemic challenges.
- Institutional support plays a critical role, though its perception varies.
- Most demographic variables do not significantly influence digital pedagogy dimensions, suggesting an increasing normalization of digital exposure in teacher education.

IX. EDUCATIONAL IMPLICATIONS

The findings of the present study have important implications for teacher education, particularly in the context of integrating digital pedagogy and fostering innovative teaching practices among prospective teachers.

9.1. Implications for Teacher Education Curriculum

The study highlights the need to restructure teacher education curricula to systematically embed digital pedagogy across all components rather than treating it as an isolated or supplementary aspect. While prospective teachers demonstrate awareness and positive attitudes, their moderate levels of readiness and competence indicate that curriculum design must move beyond theoretical exposure to practical integration.

Digital pedagogy should be incorporated within subject-specific pedagogy courses, enabling prospective teachers to understand how technology can be meaningfully aligned with content and instructional strategies. Additionally, curriculum frameworks should emphasize TPACK-based integration, ensuring the development of technological, pedagogical, and content knowledge in an interconnected manner.

9.2. Implications for Pedagogical Training and Professional Development

The findings suggest that hands-on pedagogical training is essential to bridge the gap between technological familiarity and effective classroom application. Teacher education programmes should provide opportunities for:

- Micro-teaching sessions using digital tools
- Simulation-based teaching practices
- Reflective activities focused on digital lesson design
- Exposure to real classroom scenarios involving technology integration

Furthermore, continuous professional development programmes should be designed to enhance digital pedagogical competence, particularly focusing on innovative teaching approaches such as blended learning, flipped classrooms, and project-based learning. This is especially important given the variation observed in innovative practices across disciplines.

9.3. Integration of Digital Pedagogy and Innovation

The study underscores the importance of fostering a culture of pedagogical innovation within teacher education institutions. Since innovative teaching practices vary across disciplines, there is a need for discipline-specific strategies that support the integration of digital tools in diverse subject areas.

Institutions should also strengthen support systems, including access to digital infrastructure, technical assistance, and mentorship, to reduce perceived barriers. Creating collaborative learning environments where prospective teachers can experiment with digital tools and share best practices can further enhance innovation.

Additionally, policy-level efforts should focus on aligning teacher education programmes with digital transformation goals, ensuring that prospective teachers are prepared for technology-enabled, learner-centered classrooms.

X. CONCLUSION

The present study offers a comprehensive and multidimensional understanding of prospective teachers' engagement with digital pedagogy, encompassing awareness, attitudes, readiness, digital

competence, innovative teaching practices, perceived barriers, and institutional support. The findings reveal that while prospective teachers demonstrate positive attitudes and adequate awareness—largely supported by regular exposure to technology and access to digital resources—their readiness, competence, and ability to translate technological familiarity into effective pedagogical practice remain at a moderate level. This indicates a persistent gap between access to technology and its meaningful integration into teaching–learning processes. The study further highlights that most demographic variables do not significantly influence engagement with digital pedagogy, although variations in specific dimensions such as awareness, attitudes, and innovative practices underscore the importance of contextual and experiential factors. By grounding the investigation in frameworks such as TPACK, TAM, and Constructivist Learning Theory, the study contributes empirical, survey-based evidence to the field of teacher education and offers a holistic perspective on teacher preparedness for digital classrooms, particularly within a developing educational context. At the same time, the reliance on a descriptive survey design and self-reported data, along with the sample composition, limits the generalizability and depth of insights. Therefore, future research should adopt mixed-method and longitudinal approaches, incorporate classroom-based observations and interventions, and explore diverse institutional and socio-cultural contexts to more deeply examine the development and application of digital pedagogical competence.

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