

## **Digital Competence and Attitudes Toward AI: Mindful Attention Awareness as a Mediator**

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### Abstract

The Fourth Industrial Revolution, characterized by the proliferation of Artificial Intelligence (AI), is transforming the educational landscape and calls for educators who are not only digitally proficient but also cognitively adaptive. This study investigated the relationship between digital competence and attitudes toward AI among pre-service teachers, with mindful attention awareness examined as a mediating variable. Using a descriptive survey design, data were collected from 428 pre-service teachers from government and government-aided colleges across three regions of Punjab, selected through stratified random sampling. Three standardized instruments were used, including the Digital Competence Scale, the Mindful Attention Awareness Scale, and the Attitudes toward Artificial Intelligence Scale. Correlation analysis revealed significant positive associations between digital competence, mindful attention awareness, and attitudes toward AI among pre-service teachers. Given the role of mindfulness in enhancing cognitive and emotional readiness for technology use, mindful attention awareness was explored as a potential pathway linking digital competence to attitudes toward AI. Regression analysis showed that both digital competence and mindful attention awareness significantly predicted attitudes toward AI, jointly explaining 79.6% of the variance. Path analysis confirmed a significant effect of digital competence on attitudes toward AI ( $\beta = .535$ ), with a substantial portion mediated by mindful attention awareness. These results highlight the importance of integrating development of both technological proficiency and mindful attention awareness in teacher education to prepare reflective, AI-ready educators.

*Keywords:* digital competency, attitudes toward AI, mindful attention awareness, pre-service teacher, Punjab

The Fourth Industrial Revolution, fueled by technological innovations such as Artificial Intelligence (AI), is reshaping education systems across the globe. Unlike multimedia tools and online platforms that enhance teaching and learning, AI introduces a paradigm shift wherein systems can perform tasks typically requiring human intelligence such as adaptive learning, predictive analytics, and intelligent tutoring. These shifts demand that educators not only acquire digital proficiency but also develop the cognitive and emotional capacities needed to engage ethically and reflectively with emerging AI technologies.

Digital competence is defined as an individual's ability to use digital tools, applications, and platforms effectively, safely, and responsibly. According to the European Commission's DigComp 2.2 framework (2022), digital competence comprises five key dimensions: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. In teacher education, this concept extends beyond basic digital literacy to include pedagogical applications such as designing technology-integrated lessons, analyzing student performance data, and managing virtual classrooms (Amhag et al., 2019; Falloon, 2020). Although digital literacy and digital competence are often used interchangeably, the present study adopts a broader understanding of digital competence to reflect the complex pedagogical and ethical demands of AI integration in classrooms.

While developing technological proficiency is essential, it is insufficient for ensuring the effective and ethical adoption of AI in education. AI tools raise critical concerns around autonomy, algorithmic bias, and data privacy (Aghaziarati et al., 2023), which require not just technical skills but also psychological readiness. In this context, mindful attention awareness emerges as a crucial variable. Defined as an individual's capacity to attend to present experiences with openness and without judgment (Brown & Ryan, 2003), mindful attention awareness has been linked to improved emotional regulation, cognitive flexibility, and reduced techno-stress. In educational contexts, these capacities are instrumental for pre-service teachers navigating rapidly changing technological environments. Research indicates that mindfulness contributes to better classroom management, ethical technology use, and improved educator well-being (Yang et al., 2015; Gordon et al., 2022; Rechtschaffen, 2014).

Global educational initiatives have recognized the value of mindfulness as a 21st-century competency. For instance, UNESCO's Mahatma Gandhi Institute of Education for Peace and Sustainable Development (MGIEP) promotes mindfulness, empathy, and cognitive flexibility through programs like LIBRE (Halder, 2024). These developments have influenced teacher training programs worldwide, with increasing emphasis on preparing educators to be both technologically competent and emotionally intelligent.

A third critical dimension in AI integration is attitudes toward AI encompassing beliefs, perceptions, and emotional reactions to AI technologies in education (Choi et al., 2023; Wang et al., 2023). Teachers' attitudes significantly influence their willingness to adopt AI tools. Positive attitudes are associated with openness to innovation, personalized instruction, and data-informed decision-making. Conversely, negative attitudes often rooted in anxiety, fear of job displacement, or ethical concerns can hinder adoption (Smith, 2024; Qin & Yan, 2020).

These attitudes are shaped by both cognitive factors, such as perceived usefulness, and emotional dispositions, including trust and anxiety.

Despite the growing scholarly interest in digital competence and mindfulness, limited empirical research exists on how these constructs jointly predict pre-service teachers' attitudes toward AI in education. This intersection is particularly significant in the Indian context, where the National Education Policy (NEP, 2020) underscores the need to integrate digital education with holistic learner development, including socio-emotional competencies.

Within this national framework, Punjab offers a distinctive context for exploration. The state's teacher education system is spread across diverse regions Majha, Malwa, and Doaba comprising both urban centers and under-resourced rural areas. While Punjab has made considerable progress in implementing digital initiatives such as smart classrooms, e-learning platforms, and online teacher training through programs like *ICT@Schools* and *DIKSHA*, disparities persist, particularly in rural and government-aided institutions. Studies highlight that rural colleges in districts such as Mansa, Fazilka, and Barnala face infrastructural challenges, including inadequate internet bandwidth, limited access to digital hardware, and insufficient faculty training for effective ICT integration (Nag et al., 2024; Government of Punjab, 2023). Unlike IT hubs in states such as Karnataka (Bangalore) or Maharashtra (Pune), Punjab lacks a concentrated digital investment zone, resulting in uneven policy execution. The state's education technology roadmap also shows variation in implementation across districts due to differing administrative capacities and local governance priorities (Punjab Education Department Report, 2022). These disparities contribute to a persistent digital divide between urban and rural educational institutions in the state.

Given these contextual challenges and opportunities, this study investigates how digital competence and mindful attention awareness relate to pre-service teachers' attitudes toward AI in education. In doing so, it addresses a critical research gap by examining the mediating role of psychological readiness in technology adoption within a regionally grounded, policy-relevant framework. The findings are expected to offer actionable insights for teacher education programs seeking to align with NEP directives and foster future-ready, reflective educators equipped to thrive in AI-enhanced educational ecosystems.

## Research Questions

To understand the interplay between technological proficiency and psychological readiness in teacher education, the present study is guided by the following research questions:

1. Is there a significant relationship between digital competence, mindful attention awareness, and attitudes toward AI among pre-service teachers?
2. Do digital competence and mindful attention awareness significantly predict pre-service teachers' attitudes toward AI?
3. Does mindful attention awareness mediate the relationship between digital competence and attitudes toward AI?

By exploring these questions, the study aims to uncover the complex interplay between technological skills and psychological dispositions in shaping pre-service teachers' readiness for AI integration. The findings are intended to inform more balanced and future-oriented teacher education programs that emphasize not only digital fluency but also reflective and ethical technology use.

### **Literature Review and Theoretical Framework**

The growing adoption of AI in education has transformed expectations for teacher preparedness. AI tools ranging from intelligent tutoring systems to predictive analytics demand that educators possess not only technical proficiency but also the cognitive and emotional agility to use such tools ethically and effectively.

Digital competence has emerged as a critical 21st-century skill for educators. According to the DigCompEdu framework (Christine, 2017) and India's NEP 2020, digital competence encompasses information literacy, communication, collaboration, digital content creation, and problem-solving. In the context of teacher education, it refers to the ability to select, use, and evaluate digital tools for pedagogical purposes (Amhag et al., 2019). Teachers with high digital competence are more likely to personalize learning, interpret learner analytics, and adapt content to meet diverse needs (Idowu, 2024).

While previous research (e.g., Falloon, 2020; Spante et al., 2018) has linked digital skills to positive technology adoption, few studies have directly examined how digital competence shapes attitudes toward AI, a subset of technology that demands more complex cognitive engagement. This gap is especially relevant as AI requires teachers not only to use tools but to understand algorithms, data ethics, and automation processes.

Alongside technical skills, mindfulness defined as present-focused, nonjudgmental awareness (Brown & Ryan, 2003) has gained attention in the field of education. Mindful attention awareness enhances emotional regulation, stress reduction, and cognitive flexibility (Motevalli et al., 2023; Rechtschaffen, 2014). It helps educators remain grounded in fast-paced, tech-mediated environments and may influence how they assess and integrate AI into their teaching. Programs like UNESCO MGIEP's LIBRE promote mindfulness as a foundational life skill, especially when navigating the ethical and emotional demands of digital education (Halder, 2024). Research has shown that mindfulness can reduce technostress and increase openness to innovation (Yang, 2023), suggesting it may play a moderating or mediating role in technology acceptance.

Educators' attitudes toward AI defined as beliefs and affective responses to AI tools strongly predict actual usage (Qin & Yan, 2020). Positive attitudes enhance willingness to experiment with adaptive systems, while negative ones are often linked to fear, ethical concerns, and low confidence (Wang et al., 2023; Smith, 2024). These attitudes are not fixed; they are influenced by cognitive variables (e.g., digital skills) and emotional dispositions (e.g., mindfulness).

This study integrates three theoretical models to explain how digital competence and mindfulness may jointly influence attitudes toward AI:

1. Technology Acceptance Model (TAM) posits that perceived usefulness (PU) and perceived ease of use (PEU) predict an individual's attitude toward technology and intention to use it (Davis, 1989). In this study:

- Digital competence supports PEU and PU assuming those confident with digital tools may find AI easier to use and more beneficial.
- Mindfulness may indirectly influence PU/PEU by promoting calm engagement and reducing anxiety, thus encouraging favorable perceptions of AI.

2. Theory of Planned Behavior (TPB) asserts that attitudes, subjective norms, and perceived behavioral control predict behavioral intentions (Ajzen, 1991). This model is relevant because:

- Digital competence enhances perceived behavioral control teachers who are digitally skilled feel more capable of integrating AI.
- Mindfulness could also strengthen perceived control and reduce perceived risks, influencing intention through emotional readiness.

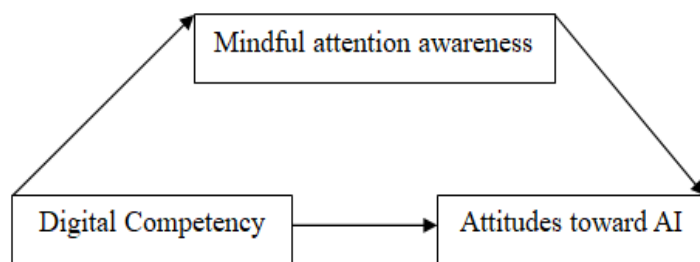
3. Cognitive Flexibility Theory (CFT) emphasizes adaptive thinking and the ability to restructure knowledge in response to novel situations key traits for AI adoption (Spiro et al., 2017).

- Mindful individuals exhibit greater cognitive flexibility, enabling them to respond thoughtfully to AI-based challenges and integrate such tools ethically.
- This theory supports the mediating role of mindfulness, suggesting that it helps translate digital competence into a balanced, open attitude toward AI.

Integrating these three models we propose a theoretical framework as follows:

- Digital competence and mindfulness both influence attitudes toward AI.
- Mindful attention awareness acts as a mediator, strengthening the effect of digital competence on AI attitudes.
- This approach reflects an emerging paradigm in teacher education that values both technical and psychological readiness for AI integration.

**Figure 1**  
*Theoretical Model*



This integrated model holds particular relevance in the Indian educational landscape, with the NEP emphasizing the development of educators who are both digitally proficient and reflective in their pedagogical practice (NEP, 2020). By transcending reductionist approaches that address either technological skills or psychological dispositions in isolation, the present model offers a more holistic and balanced conceptualization of AI readiness in teacher education. It underscores the imperative for cultivating both cognitive and affective competencies among pre-service teachers, thereby aligning with contemporary demands for ethically informed and contextually responsive integration of artificial intelligence in educational settings.

### Hypotheses of the Study

The study proposes the following hypotheses based on the theoretical framework and literature reviewed:

- H1:** There is a significant positive correlation between digital competency, mindful attention awareness, and attitudes toward artificial intelligence among pre-service teachers.
- H2:** Digital competency and mindful attention awareness significantly predict attitudes toward artificial intelligence among pre-service teachers.
- H3:** Mindful attention awareness mediates the relationship between digital competency and attitudes toward artificial intelligence among pre-service teachers.

### Methodology

This study used a descriptive quantitative research design to examine the mediating role of mindful attention awareness in the relationship between digital competence and attitudes toward AI among pre-service teachers in Punjab, India. A path analysis approach was utilized to test the hypothesized relationships among the study variables.

The participants of the study consisted of prospective teachers enrolled in Bachelor of Education (BEd) programs across government and government-aided colleges from the three major regions of Punjab: Majha, Malwa, and Doaba. To ensure representativeness and adequate regional coverage, a stratified random sampling technique was adopted. Initially, 500 prospective teachers were approached. After screening the data for completeness and

consistency, 428 valid responses were retained for the final analysis. The final sample size was deemed sufficient for statistical procedures including correlation, regression, and path analysis. It is important to note that responses were based on participants' subjective perceptions, which may be influenced by personal experience and contextual factors. Collaboration with college principals played a crucial role in participant recruitment. Principals were contacted through formal letters, emails, and follow-up phone calls to obtain institutional permission. The data collection was conducted over four weeks during the academic semester. A structured questionnaire was distributed through Google Forms, enabling broad and efficient access to participants. Repeated follow-ups were conducted with faculty coordinators to ensure maximum participation and timely submission of responses.

To examine the relationships among the study variables and test the proposed model, a comprehensive statistical analysis was conducted. Descriptive statistics, including means, standard deviations, minimum, and maximum values, were calculated to summarize the dataset. Pearson's correlation coefficients were computed to determine the strength and direction of relationships among digital competence, mindful attention awareness, and attitudes toward artificial intelligence (AI). To assess the predictive power of digital competence and mindful attention awareness on attitudes toward AI, multiple regression analysis was employed. Additionally, mediation analysis was carried out to evaluate the indirect effect of mindful attention awareness in the relationship between digital competence and attitudes toward AI.

All statistical analyses were conducted using SPSS (Statistical Package for the Social Sciences) version 26.0 and AMOS (Analysis of Moment Structures) version 21.0, ensuring methodological accuracy and robustness.

### **Ethical Considerations**

Although formal institutional ethical approval was not obtained, the study adhered strictly to ethical standards for research involving human participants. All participants were clearly informed about the purpose and objectives of the study. An informed consent form was integrated at the beginning of the online survey, and only those who provided explicit consent were allowed to proceed.

Participants were assured of the anonymity, confidentiality, and voluntary nature of their participation, including the right to withdraw from the study at any time without any consequences. No personally identifying information was collected, and the data were used solely for academic purposes. The study conformed to widely accepted ethical guidelines in educational and social science research, including the protection of participant autonomy, dignity, and data privacy.

## Measures

The research tools used for this study were divided into two sections: demographic information and psychological variables. The first section collected information on participant's locale, age and gender. The second section assessed three variables: mindful attention awareness, digital competence, and attitude towards artificial intelligence.

1. Digital competence developed by Ramakrishna and Phoghat, (2017), was used to assess Digital Literacy among preservice teachers. The scale consists of 50 items and follows a 5-point Likert scale ranging from (1 = Strongly Disagree to 5 = Strongly Agree). The digital competence demonstrated strong test-retest reliability with a correlation coefficient of 0.89. Sample items include:  
*"I can communicate online with other students for homework assignments."*  
*"I know how to connect various hardware components of computers."*
2. Additionally, mindful attention awareness was assessed using the Mindful Attention Awareness Scale (MAAS) by Brown and Ryan (2003). This 15-item tool is rated on a 6-point Likert scale (1 = Almost Always to 6 = Almost Never) and measures dispositional mindfulness, where higher score indicates greater mindfulness. The MAAS demonstrated strong internal consistency, with Cronbach's alpha value ranging from 0.77 to 0.91. The scale included items such as:  
*"I could be experiencing some emotion and not be conscious of it until sometime later."*  
*"I break or spill things because of carelessness, not paying attention, or thinking of something else."*
3. Lastly, attitude towards artificial intelligence was measured using the Artificial Intelligence Scale developed by Mukherjee and Dasgupta (2024). This 30-item scale, based on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), evaluates four key dimensions: General Understanding, Perceived Benefits, Concerns, and Applications. The scale demonstrated strong reliability (Cronbach's alpha = 0.832) and construct validity (0.679). Sample items include:  
*"AI is an advanced technology that is only beneficial for the wealthy."*  
*"Spread of AI-based machines and software in every sector will reduce socialization, so it is not suitable for Indian culture."*

**Table 1**  
*Demographic Profile of the Sample (428)*

Variables	Category	<i>f</i>	%
Gender	Male	216	51%
	Female	212	49%
Age	18-22 years	330	77%
	20-25 years	98	23%
Locale	Rural	186	43%
	Urban	242	57%

Note: *f*- Frequency, %- Percentage

Table 1 presents the demographic characteristics of the participants. The sample consisted of 428 pre-service teachers, of whom 216 identified as male (51%) and 212 as female (49%), indicating a nearly equal gender distribution. In terms of age, the majority of participants ( $n = 330$ , 77%) were between 18 and 22 years old, while a smaller proportion ( $n = 98$ , 23%) were within the 23 to 25 years age range. Regarding locale, 186 participants (43%) reported residing in rural areas, whereas a slightly higher proportion, 242 participants (57%), were from urban regions. These demographics provide a balanced representation across gender and residential backgrounds, with a predominant concentration of younger pre-service teachers.

## Results

It is important to note that the analysis is based on cross-sectional, self-reported data, and the findings are associational in nature.

**Table 2**  
*Descriptive Analysis of Data (N = 428)*

Variable	Mean	S.D.	Minimum	Maximum
Digital Competence	71.17	23.68	31	140
Mindful Attention Awareness	65.50	12.75	25	82
Attitudes toward AI	67.56	16.83	28	132

Note: *S.D.*-Standard Deviation

The descriptive statistics indicate that the pre-service teachers in the sample demonstrated a moderate level of digital competence ( $M = 71.17$ ,  $SD = 23.68$ ), mindful attention awareness ( $M = 65.50$ ,  $SD = 12.75$ ), and attitudes toward AI ( $M = 67.56$ ,  $SD = 16.83$ ). The wide range in digital competence ( $Min = 31$ ,  $Max = 140$ ) suggests considerable variability in participants' technical skills, while the narrower range for mindful awareness indicates relatively more consistent self-reported mindfulness. Attitudes toward AI also varied notably across the

sample, reflecting diverse perspectives on the integration of artificial intelligence in educational settings.

Table 3 displays the Pearson correlation coefficients among digital competence, mindful attention awareness, and attitudes toward artificial intelligence (AI) among pre-service teachers.

**Table 3**

*Correlation Matrix: Digital Competence, Mindful Attention Awareness, and Attitudes toward AI among Pre-Service Teachers (N = 428)*

Variables	Digital Competence	Mindful Attention Awareness	Attitudes toward AI
Digital Competence	1		
Mindful Attention Awareness	.685**	1	
Attitudes toward AI	.748**	.867**	1

*Note:  $p < .01$*

Digital competence was found to be positively and significantly correlated with mindful attention awareness ( $r = .685$ ,  $p < .01$ ), indicating that higher levels of digital proficiency are associated with greater mindfulness. Similarly, digital competence demonstrated a strong, positive correlation with attitudes toward AI ( $r = .748$ ,  $p < .01$ ), suggesting that digitally competent individuals are more likely to hold favorable views toward the integration of AI in education. Furthermore, mindful attention awareness was highly correlated with attitudes toward AI ( $r = .867$ ,  $p < .01$ ), highlighting the potential role of mindfulness in shaping pre-service teachers' openness to AI technologies. Therefore, the H1, which states that “*There is a significant positive correlation between digital competency, mindful attention awareness, and attitudes toward artificial intelligence among pre-service teachers*”, is approved.

Multiple regression analysis was conducted to examine the extent to which digital competence and mindful attention awareness predict attitudes toward artificial intelligence (AI) among pre-service teachers (See Table 4).

**Table 4**

*Multiple Regression Predicting Attitudes Toward AI (N= 428)*

Predictor	B	S.E.	$\beta$	t	p
(Constant)	-4.893	1.947	—	-2.513	.012
Digital Competence	.207	.021	.291	9.692	.000**
Mindful Attention Awareness	.881	.040	.667	22.211	.000**

$R = .892$ ,  $R^2 = .796$ ,  $Adjusted R^2 = .795$ ,  $F(2, 425) = 830.245$ ,  $p < .001$

The overall model was statistically significant,  $F(2, 425) = 830.25, p < .001$ , explaining approximately 79.6% of the variance in attitudes toward AI ( $R^2 = .796$ , Adjusted  $R^2 = .795$ ). Both predictors made significant contributions to the model. Digital competence was a significant positive predictor ( $\beta = .291, t = 9.69, p < .001$ ), indicating that higher levels of digital skills are associated with more favorable attitudes toward AI. Mindful attention awareness also significantly predicted attitudes toward AI ( $\beta = .667, t = 22.21, p < .001$ ), and was a stronger predictor than digital competence. These results suggest that both technological proficiency and present-moment awareness play a crucial role in shaping pre-service teacher's openness and readiness to engage with AI in educational settings. Therefore, the H2, which states that “*Digital competency and mindful attention awareness significantly predict attitude toward artificial intelligence among pre-service teachers*”, is also approved.

## Figure 2

Path diagram showing direct and indirect effects

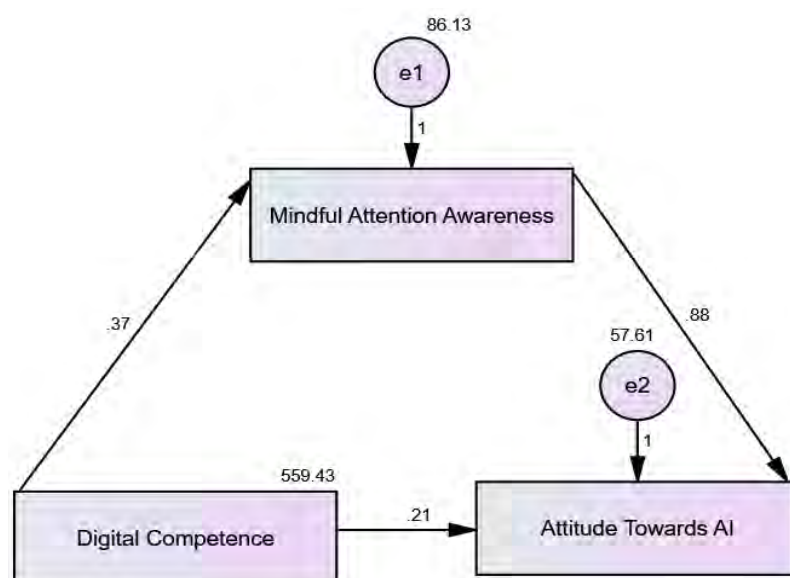


Figure 2 presents the path diagram illustrating both the direct and indirect effects of digital competence on attitudes toward artificial intelligence (AI) through the mediating role of mindful attention awareness. The direct effect of digital competence on attitudes toward AI was statistically significant ( $\beta = .21$ ), suggesting a modest yet meaningful influence. Additionally, digital competence significantly predicted mindful attention awareness ( $\beta = .37$ ), which in turn strongly predicted attitudes toward AI ( $\beta = .88$ ), indicating a substantial indirect effect. The total effect of digital competence on attitudes toward AI, incorporating both the direct and indirect pathways, reflects a more robust influence, highlighting the mediating role of mindfulness in this relationship. This model demonstrates that while digital competence contributes directly to shaping pre-service teacher's attitudes toward AI, its influence is significantly enhanced when it also fosters mindful awareness, thereby promoting more thoughtful and adaptive engagement with emerging educational technologies. Therefore, the H3, which states that “*Mindful attention awareness mediates the relationship between digital*

*competency and attitudes toward artificial intelligence among pre-service teachers*”, is supported.

Table 5 presents the regression weights for the hypothesized structural model examining the relationships among digital competence, mindful attention awareness, and attitudes toward artificial intelligence (AI).

**Table 5**  
*Regression Weights: (Default Model)*

Variables	Estimate	S.E.	C.R.	p
Mindful Attention Awareness ← Digital Competence	.369	.019	19.412	***
Attitude Towards AI ← Mindful Attention Awareness	.881	.040	22.264	***
Attitude Towards AI ← Digital Competence	.207	.021	9.715	***

Note: S.E- Standard Error, C.R- Critical Ratio, \*\*\*-<0.001

The results indicate that digital competence significantly predicts mindful attention awareness ( $\beta = .369$ ,  $SE = .019$ ,  $CR = 19.412$ ,  $p < .001$ ), suggesting that higher levels of digital competence are associated with greater mindful awareness among pre-service teachers. Furthermore, mindful attention awareness significantly predicts attitudes toward AI ( $\beta = .881$ ,  $SE = .040$ ,  $CR = 22.264$ ,  $p < .001$ ), highlighting its strong influence on how pre-service teachers perceive and engage with AI technologies. Digital competence also exhibits a significant direct effect on attitudes toward AI ( $\beta = .207$ ,  $SE = .021$ ,  $CR = 9.715$ ,  $p < .001$ ), reinforcing the notion that technological proficiency plays a critical role in shaping educators' dispositions toward AI.

## Discussion

This study examined the relationships among digital competence, mindful attention awareness, and attitudes toward AI in pre-service teachers, with a particular focus on the mediating role of mindfulness. The findings addressed all three research hypotheses and provide valuable insights into how psychological and technological traits interact in the context of 21st-century teacher education.

Supporting Hypothesis 1, the results revealed significant positive correlations among digital competence, mindful attention awareness, and attitudes toward AI. This finding is consistent with prior studies by Spante et al. (2018) and Hatlevik et al. (2015), who observed that greater digital competence enhances confidence and fosters positive perceptions of educational technologies. Similarly, Sütçü and Dönmez (2023) found that digitally skilled pre-service

teachers are more inclined to engage with innovative instructional tools, including AI-driven platforms.

In line with Hypothesis 2, multiple regression analysis demonstrated that both digital competence and mindful attention awareness significantly predicted attitudes toward AI, jointly explaining 79.6% of the variance in the outcome variable. Importantly, mindful attention awareness emerged as the stronger predictor, suggesting that psychological readiness may have a more profound influence on technology acceptance than technical skills alone. This finding resonates with research by Brown and Ryan (2003) and Meiklejohn et al. (2012), who emphasize that mindfulness fosters cognitive flexibility, emotional regulation, and openness to new experiences, traits essential for embracing emerging technologies in education. Further supporting this, Zhou and Chen (2021) found that individuals with higher levels of mindfulness were less resistant to AI-enabled tools due to their adaptive and accepting mindset.

Addressing Hypothesis 3, the mediation analysis revealed that mindful attention awareness partially mediates the relationship between digital competence and attitudes toward AI. This suggests that while digital competence directly influences attitudes, its impact is enhanced through mindfulness, which facilitates reflective engagement and reduces resistance to technological innovation. This finding aligns with the theoretical framework of Fredricks et al. (2004), who proposed that dispositional traits play a key role in shaping cognitive and behavioral engagement. Similarly, Kostova and Dimitrova (2022) demonstrated that mindfulness training improved pre-service teachers' openness to digital learning tools, supporting the mediating role of mindfulness in technology acceptance.

The study's findings are further underpinned by Self-Regulation Theory (Zimmerman, 2000) and Cognitive Load Theory (Sweller, 1988), both of which underscore the importance of attentional control and emotional regulation in learning and decision-making. Mindfulness, by enabling individuals to remain present-focused and self-aware, contributes to managing cognitive load and reducing techno-stress, thereby facilitating more thoughtful and confident engagement with AI in the classroom.

From a pedagogical perspective, these results align with the work of Laursen and Nielsen (2016) and Nissila et al. (2022), who advocate for emotionally grounded, competence-based approaches to teacher education. These approaches are especially relevant to the goals of India's National Education Policy (NEP, 2020), which emphasizes the need for reflective, adaptive, and technologically proficient educators who can navigate the ethical and practical challenges posed by AI and digital transformation.

Finally, this study contributes to the growing literature highlighting the dual importance of digital fluency and psychological flexibility in preparing teachers for AI-integrated learning environments (e.g., Choi, 2024; Bothe, 2023). The findings suggest that teacher training programs should move beyond technical training alone to incorporate mindfulness-based interventions, equipping future educators with the emotional resilience and cognitive adaptability required to thrive in complex, technology-enhanced educational settings.

## Practical Implications

Given these findings, several pedagogical and policy-oriented implications emerge. First, teacher education programs must prioritize the systematic inclusion of digital competence modules that provide hands-on experience with AI tools and data-informed instructional strategies. Second, the incorporation of structured mindfulness training into teacher preparation curricula is strongly recommended. Such interventions may include practices that develop attentional focus, emotional resilience, and metacognitive awareness competencies that are vital for managing the cognitive demands and ethical dilemmas posed by AI integration.

Third, curriculum developers are encouraged to adopt interdisciplinary approaches that fuse technological proficiency with psychological well-being, thereby cultivating educators who are both technically adept and emotionally balanced. Such hybrid curricula will ensure that the next generation of teachers can engage meaningfully with AI while maintaining a strong humanistic orientation in their pedagogical practices. Finally, policymakers and regulatory bodies should consider establishing national guidelines and assessment frameworks that recognize the dual importance of digital and dispositional competencies in teacher education. Such standards will promote consistency and accountability in preparing educators for an AI-enriched educational future.

Therefore, this study underscores the critical importance of adopting a holistic, future-facing perspective in teacher education, one that acknowledges not only the instrumental role of digital skills but also the foundational influence of mindful awareness in shaping adaptive and ethical engagement with artificial intelligence in education.

## Conclusion

This study provides empirical evidence of the significant interrelationships between digital competence, mindful attention awareness, and attitudes toward AI among pre-service teachers. The results supported all three research hypotheses: digital competence and mindfulness were positively correlated with favorable attitudes toward AI, and mindfulness significantly mediated the relationship between digital competence and attitudes toward AI. These findings highlight that while technological proficiency is important, psychological dispositions such as mindfulness play an equally crucial role in influencing how future educators perceive and integrate AI tools in educational settings.

The multiple regression and path analyses revealed that mindful attention awareness was a stronger predictor of AI-related attitudes than digital competence. This underscores the importance of preparing educators not only with technical knowledge but also with cognitive and emotional tools to navigate complex, AI-integrated learning environments. These results align with theoretical frameworks such as Self-Regulation Theory and are supported by prior research emphasizing the influence of affective and dispositional traits in educational technology adoption.

However, several limitations must be acknowledged. First, the study relied on cross-sectional, self-reported data, which may be influenced by social desirability bias and participants' subjective interpretations, potentially affecting the precision of the findings. Second, the non-experimental research design prevents causal inferences. While path analysis was used to explore directional relationships, the possibility of endogeneity where digital competence and attitudes toward AI may influence each other reciprocally cannot be fully ruled out. Moreover, the sample was restricted to pre-service teachers from three regions of Punjab (Majha, Malwa, and Doaba), which may limit the generalizability of the findings to broader populations with different cultural or educational contexts. Despite efforts to ensure regional representation through stratified sampling, the results may not fully reflect the perspectives of pre-service teachers across India or globally. Furthermore, the study did not incorporate qualitative methods, such as interviews or open-ended responses, which could have provided deeper, contextual understanding and served to validate the quantitative findings.

To build upon the current findings, future research should consider using longitudinal or experimental designs to examine causal relationships and temporal changes in digital competence, mindfulness, and technology-related attitudes. Expanding the sample to include diverse regions, institutional types (e.g., private colleges), and in-service teachers would enhance the external validity of the study. Additionally, investigating other potential mediating or moderating variables such as digital self-efficacy, AI-related anxiety, or institutional support could offer a more comprehensive understanding of the psychological and contextual factors influencing AI adoption in teacher education.

### **Acknowledgment of AI Use**

The authors would like to acknowledge the use of artificial intelligence (AI) tools in the preparation of this manuscript. The AI tool *ChatGPT* was used exclusively for grammar checking and language refinement. All AI-assisted text was carefully reviewed and edited by the authors to ensure accuracy, clarity, and academic integrity. AI tools were not used for any other purposes, including data generation, data analysis, development of methodology, or interpretation of findings and conclusions. The authors take full responsibility for the content and quality of the final manuscript.

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