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The Influence Of Ai Anxiety And Ai Literacy On Pre-Service Teachers' Tpack-Based Teaching Readiness At Xyz University Tangerang: The Mediating Role Of Self-Efficacy

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Abstract

This study investigates the influence of AI Anxiety and AI Literacy on pre-service teachers' TPACK-based teaching readiness, mediated by self-efficacy. Data were collected from 131 pre-service teacher students at the Faculty of Education, Universitas XYZ Tangerang (cohorts 2023–2024) and analysed using PLS-SEM via SmartPLS 4. Structural path analysis revealed that AI Anxiety exerted no significant effect on TPACK-based teaching readiness (β = 0.032, p = .340) nor on self-efficacy (β = 0.027, p = .392). AI Literacy demonstrated no direct effect on teaching readiness (β = 0.043, p = .298); however, it positively and significantly predicted self-efficacy (β = 0.379, p < .001). Self-efficacy exerted a strong positive effect on teaching readiness (β = 0.728, p < .001) and was confirmed as a full mediator of the AI Literacy–teaching readiness relationship (β = 0.276, p < .001). The model accounted for 57.0% of the variance in teaching readiness (R^2 = .570). Follow-up interviews revealed that non-inhibitory AI Anxiety was interpreted as responsible driven-anxiety — a values-based anxiety rooted in moral responsibility. These findings underscore self-efficacy as the critical pathway linking AI Literacy to teaching readiness. Future research should develop more contextually sensitive AI Anxiety instruments and examine value-based variables as potential moderators.

Keywords: AI Anxiety, AI Literacy, Self-Efficacy, TPACK, Pre-service Teacher, Teaching readiness

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INTRODUCTION

Artificial Intelligence (AI) has become an inseparable part of the learning process and has the potential to transform pedagogical strategies and learning methods to prepare students with twenty-first-century skills (Alshorman, 2024). However, several international studies indicate that teachers' TPACK-based teaching readiness remains relatively low, particularly in designing AI-based learning and implementing AI in adaptive and personalized ways for students (Zaki & Ulya, 2025). In Indonesia, teachers have begun leveraging AI to support learning; however, their ability to adapt AI-generated outputs to students' needs and critically evaluate the risks associated with its use remains limited (BRIN, 2025). Besides the importance of AI Literacy in helping teachers understand, evaluate, and use AI effectively (Cetin & Celen, 2025), the implementation of AI in education is also influenced by psychological factors, namely AI Anxiety and self-efficacy. AI Anxiety can affect teachers' willingness to adopt technology in learning (Kun, 2025), whereas self-efficacy plays an important role in bridging knowledge and attitudes toward AI use with its implementation in educational contexts (Fitriana, 2025).

The urgency of this study arises from the context of pre-service teachers from the Faculty of Education at XYZ University, specifically the cohorts of 2023 and 2024, who are currently preparing themselves to become professional teachers in the AI era. Although they belong to Generation Z and are highly familiar with technology, competencies related to AI Literacy and TPACK-based teaching readiness have not yet become a primary focus in teacher education curricula. Therefore, examining the influence of AI Literacy and AI Anxiety on TPACK-based teaching readiness, with self-efficacy serving as a mediating variable, is important for understanding pre-service teachers' readiness to face educational transformation in the era of artificial intelligence.

This study enriches the application of Bandura's Social Cognitive Theory in the context of Artificial Intelligence by demonstrating that AI Literacy alone is insufficient to develop TPACK-based teaching readiness without adequate self-efficacy and the ability to manage AI Anxiety. Practically, the findings confirm the importance of strengthening AI literacy, self-efficacy, and the psychological readiness of pre-service teachers. Furthermore, the findings can serve as a foundation for the Faculty of Education at XYZ University and its lecturers in developing curricula and learning experiences that are relevant to the demands of the artificial intelligence era, while also providing a reference for future research.

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Overview Of Tpack-Based Teaching Readiness

Twenty-first-century learning has transformed the mindset of educational processes from conventional approaches to technology-integrated learning, making TPACK an important factor influencing pre-service teachers' readiness to become professional educators (Ariyani & Kurniawan, 2024, p. 6204). TPACK-based teaching readiness refers to an individual's readiness to carry out professional teaching responsibilities through the integration of technological, pedagogical, and content knowledge throughout the learning process in the digital era (Gani, Saylendra, & Nugraha, 2023). The higher the level of TPACK competencies possessed by teachers or pre-service teachers, the greater their readiness to utilize technology in creating effective and high-quality learning experiences (Yusuf, Riska, & Setyawan, 2025). This competence is also reflected in the ability to utilize AI technologies, particularly Generative AI, to facilitate effective, creative, and goal-oriented learning. When pre-service teachers experience AI Anxiety, they may be less willing to explore and utilize AI in educational settings, which can reduce their level of technological mastery and their TPACK-based teaching readiness. Therefore, it is assumed that AI Anxiety negatively influences pre-service teachers' TPACK-based teaching readiness, such that higher levels of AI Anxiety are associated with lower levels of readiness to integrate technology, pedagogy, and content in teaching.

In this study, TPACK-based teaching readiness is measured through seven dimensions: Technological Knowledge (TK), Content Knowledge (CK), Pedagogical Knowledge (PK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK) (Surayanah, Rofiki, & Ramila, 2024).

Overview Of Ai Anxiety

AI Anxiety refers to a negative affective response characterized by feelings of fear, worry, or discomfort toward the development and use of Generative Artificial Intelligence (AI). Such feelings may arise due to a lack of understanding, uncertainty regarding AI development, and perceptions that AI may threaten human roles (Wang & Wang, 2019, as cited in Puspa & Suryawidjaja, 2025). In the educational context, AI Anxiety is important to examine because it can influence the acceptance and implementation of AI by teachers and pre-service teachers in learning. Previous studies have revealed that one of the factors influencing AI Anxiety is self-efficacy, in which individuals with strong self-efficacy tend to perceive AI as an opportunity rather than a threat (Javaid et al., 2025, p. 3428). AI Anxiety has also been identified as a contextual

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factor that influences self-efficacy, particularly in the current era of technology and artificial intelligence (Puspa & Suryawidjaja, 2025, p. 1403). Furthermore, Javaid et al. (2025) stated that AI Anxiety tends to decrease when individuals possess higher confidence in their ability to understand and use AI.

In this study, AI Anxiety is measured through four dimensions: (1) learning anxiety, (2) job replacement anxiety, (3) sociotechnical blindness, and (4) configuration anxiety (Wang et al., 2022).

Overview Of Ai Literacy

AI Literacy refers to the ability to understand, use, select, and critically evaluate Artificial Intelligence (AI) while considering the moral and social responsibilities associated with its use (Wang et al., 2022, as cited in Sari et al., 2025). In the educational context, AI Literacy has become an essential competency for teachers and pre-service teachers to effectively and responsibly leverage AI in teaching and learning processes (Kuzu, 2026). By possessing foundational AI literacy skills, educators can also effectively prepare students to navigate a world that increasingly demands AI-related competencies (Laru et al., 2025, p. 964). When pre-service teachers possess sufficient AI Literacy, including the ability to select, integrate, and evaluate AI in educational settings, their TPACK-based teaching readiness can be strengthened.

In this study, AI Literacy is measured through three dimensions: understanding AI, using AI, and AI evaluation and ethics, which encompass the ability to evaluate the effectiveness, limitations, risks, and ethical implications of AI use in education (Carolus et al., 2023).

Overview Of Self-Efficacy

Self-efficacy refers to an individual's belief in their capability to perform specific behaviors, which influences the level of effort exerted, perseverance in facing difficulties, optimism or pessimism regarding outcomes, and the ways individuals think, feel, motivate themselves, and behave (Akgoz, Sahin, & Sonmez, 2025, pp. 3–4). In the current era of digital technology, self-efficacy and digital competencies, particularly AI Literacy, need to be integrated through training and self-efficacy development initiatives to minimize teachers' failure to use and implement educational technologies effectively. This is because a high level of knowledge, particularly an understanding of AI, can enhance the self-efficacy of both teachers and pre-service teachers (Ozden, Yasar, & Meydan, 2024, p. 31). Self-efficacy has become an important mediating factor in AI adoption because it reflects individuals' confidence in their ability to use and operate

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technology effectively (Javaid et al., 2025, p. 3424). Previous studies have shown that students with higher self-efficacy in using AI tend to use AI more frequently but may also experience higher levels of anxiety and greater dependency on AI (Morales-Garcia et al., 2025, p. 1). Fitriana's (2025) study further demonstrated that AI Literacy and attitudes toward AI do not automatically lead to readiness or the effective use of AI in learning; therefore, self-efficacy serves as a key mediating variable that bridges knowledge and attitudes toward AI implementation in the context of higher education (Fitriana, 2025, p. 203).

In this study, self-efficacy is measured through three dimensions: (1) the level or magnitude dimension, which refers to the degree of task difficulty that individuals believe they can successfully accomplish, as individuals tend to engage in behaviors they perceive as within their capabilities and avoid those they perceive as exceeding their abilities; (2) the generality dimension, which refers to the breadth of situations or tasks in which individuals believe they can perform successfully; and (3) the strength dimension, which refers to the degree of confidence individuals have regarding their capabilities (Suartini et al., 2023, p. 2467).

Overview Of Pre-Service Teacher

Pre-service teachers are individuals who are undergoing teacher education and training but have not yet attained the status of certified professional teachers (Zhao & Zhang, 2017, as cited in Hamiddin et al., 2025). They occupy a unique transitional position between being university students and future educational practitioners, making teacher preparation a crucial period for developing professional identity, teaching competence, self-efficacy, and commitment to the teaching profession (Hamiddin et al., 2025; Mod, 2026). Consequently, teaching readiness should be viewed as a gradual and continuous professional development process in which pre-service teachers connect theoretical knowledge with authentic teaching experiences through practicum, reflective activities, mentoring, and interactions within school environments (Patterson & Hartley, 2026). As future professionals, they are expected to develop pedagogical, personal, social, and reflective competencies, as well as ethical responsibility as educators (Meyer, Doll, & Kaiser, 2023; Keiler et al., 2020, as cited in Hamiddin et al., 2025). In Indonesia, the strategic importance of preparing pre-service teachers is further emphasized by Law of the Republic of Indonesia Number 14 of 2005, which highlights the need for systematic and sustainable teacher preparation.

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RESEARCH MODEL

This study employed a non-experimental quantitative research design, which involves numerical data, statistical analyses, and an in-depth examination of correlations, surveys, and causal-comparative relationships (Rukminingsih, Adnan, & Latief, 2020). The study also incorporated a mediating variable as an intervening variable that serves as a bridge between exogenous and endogenous variables, enabling the identification of indirect yet significant effects within the PLS-SEM model (Subasman et al., 2025, p. 98). The study was conducted over approximately ten months, beginning with proposal development and literature review in July 2025 and ending with data collection and analysis in May 2026. The study utilized primary data collected directly from 131 students of the Faculty of Education at XYZ University from various study programs in the 2023 and 2024 cohorts.

This study employed a PLS-SEM model because the researcher sought to examine the relationships among multiple variables within a complex model (Supriyono et al., 2024, p. 38). The model examined the effects of the exogenous variables, namely AI Anxiety (X1) and AI Literacy (X2), on the endogenous variable, namely TPACK-based teaching readiness (Y), with self-efficacy serving as the mediating variable (M). The proposed model was subsequently analysed using SmartPLS 4. The data were analysed using PLS-SEM through SmartPLS 4. The analysis consisted of two stages: the evaluation of the outer model and the inner model. The outer model assessment aimed to evaluate construct validity and reliability through the Average Variance Extracted (AVE), Heterotrait-Monotrait Ratio (HTMT), and Composite Reliability tests (Hamid & Anwar, 2019). Meanwhile, the inner model assessment examined the relationships among latent variables through Variance Inflation Factor (VIF), R-square, and bootstrapping analyses of direct and indirect effects (Surya, Rosyadi, & Kurniawati, 2024).

Hypothesis

Based on the proposed research model, the hypotheses of this study are formulated as follows:

1. **H1:** AI Anxiety negatively affects pre-service teachers' TPACK-based teaching readiness.
2. **H2:** AI Literacy positively affects pre-service teachers' TPACK-based teaching readiness.
3. **H3:** AI Anxiety negatively affects pre-service teachers' self-efficacy.
4. **H4:** AI Literacy positively affects pre-service teachers' self-efficacy.
5. **H5:** Self-efficacy positively affects pre-service teachers' TPACK-based teaching readiness.

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6. **H6:** AI Anxiety negatively affects pre-service teachers' TPACK-based teaching readiness through the mediation of self-efficacy.
7. **H7:** AI Literacy positively affects pre-service teachers' TPACK-based teaching readiness through the mediation of self-efficacy.

Data Collection Techniques

Data were collected using a survey method through an online questionnaire with a five-point Likert scale. The questionnaire had been validated and contained statements corresponding to the indicators of the AI Anxiety, AI Literacy, self-efficacy, and TPACK-based teaching readiness variables. The following section presents the instrument blueprint for each variable.

Table 1. TPACK Based Teaching Readiness - Instrument Grid Table

Dimensions / Indicators	No	Statement
Readiness knowledge technology	34	I can understand the basic functions of AI technologies that can be used in learning.
	35	I can use AI-based applications to support learning
	36	I can understand the limitations of AI technologies used in learning.
Readiness knowledge content	37	I can develop teaching materials with AI support.
	38	I can use AI to simplify complex materials so that they are easier for students to understand.
	39	I can identify parts of teaching materials that require AI support to make them easier for students to understand.
Readiness knowledge pedagogical	40	I can choose learning strategies that integrate AI.
	41	I can organize the use of AI to encourage active student participation.
	42	I can organize the use of AI according to students' learning styles.
Readiness integration content and pedagogy	43	I can determine the appropriate use of AI based on the needs of the learning material.
	44	I can use AI to provide alternative explanations when students have difficulty understanding the material.
	45	I can ensure that the use of AI aligns with the learning objectives of the material being taught.

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Dimensions / Indicators	No	Statement
Readiness integration content and technology	46	I can choose appropriate AI technologies to explain specific learning materials.
	47	I can use AI to help students understand difficult concepts.
	48	I can adapt the use of AI according to the type of material being taught.
Readiness integration pedagogy and technology	49	I can use AI to support my chosen teaching strategies.
	50	I can adapt the use of AI to differentiated learning approaches.
	51	I can use AI to assess students' understanding in accordance with the learning objectives.
Readiness integration content, pedagogy, and technology	52	I can design learning materials, learning strategies, and AI technologies in an integrated and coherent manner.
	53	I can determine the appropriate AI technologies according to the characteristics of the learning material and students' needs.
	54	I can teach by integrating content, pedagogy, and AI technologies simultaneously to enhance learning quality.

Table 2. AI Anxiety - Instrument Grid Table

Dimensions / Indicators	No	Statement
Learning Anxiety Anxiety moment learns or using AI	1	When I must use AI in learning activities, I feel tense or worried that I will make mistakes in using it.
	2	When I must learn a new AI feature or application, I feel tense or worried that I will not be able to understand it well.
	3	In learning situations involving AI, I worry that the information provided by AI may not be accurate.
Job replacement anxiety Concerns that AI development can replace role of teachers	4	I feel worried about the possibility that AI may reduce or replace the role of teachers in the future.
	5	I feel worried that AI's ability to explain materials or answer questions automatically may diminish the role of teachers.
	6	I feel worried that teachers' abilities may be considered less important when students use AI in learning.

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Dimensions / Indicators	No	Statement
Sociotechnical anxiety	7	I feel worried when I must use AI-generated responses whose sources I cannot verify.
Anxiety consequence misunderstanding method work and risk use of AI	8	I feel worried when learning becomes too dependent on AI.
	9	I feel uncomfortable as a pre-service teacher when I do not have control over the use of AI in learning.
AI Configuration Anxiety	10	I feel tense when technical errors occur while using AI in learning simulations.
Anxiety moment interacts and operates AI system	11	I feel worried when the use of AI in the classroom cannot be fully controlled.
	12	I feel worried if disruptions or errors occur when learning relies on AI to generate materials or example questions.

Table 3. AI Literacy - Instrument Grid Table

Dimensions / Indicators	No	Statement
Understanding AI capabilities understand the concept and role of AI in learning	13	I understand that the quality of AI-generated responses in learning contexts is influenced by how I formulate prompts.
	14	I understand that AI-generated outputs are not always accurate and need to be verified using reliable sources.
	15	I understand that AI serves as a supportive tool for teachers' pedagogical decision-making rather than a replacement for teachers.
Use of AI utilizing and integrating AI in learning	16	I can use AI to improve instructional design.
	17	I can select appropriate educational AI technologies based on learning objectives.
	18	I use AI as a thinking partner in developing learning ideas.
AI evaluation and ethics ability evaluate accuracy,	19	I verify information generated by AI before using it in learning activities.
	20	I consider the possibility of inaccuracies when AI is used to evaluate students' work.

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Dimensions / Indicators	No	Statement
limitations, and implications ethical use of AI in learning	21	I consider the impact of AI use on students' critical thinking processes.
AI Configuration Anxiety Anxiety moment interacts and operates AI system	22	I recognize the importance of using AI in a balanced manner so that it does not diminish the pedagogical role of teachers.
	23	I consider the pedagogical implications before using recommendations generated by AI in learning.
	24	I consider privacy and data security risks when using AI in learning.

Table 4. Self-Efficacy - Instrument Grid Table

Dimensions / Indicators	No	Statement
Level (Magnitude) Belief finish task with level difficulty certain	25	I can leverage AI to help explain complex learning materials to students.
	26	I can integrate AI as a supporting tool in lesson planning.
	27	I can use AI to support complex student assessment and evaluation processes.
Generality Belief can be implemented in various situation	28	I believe that my ability to use AI can be applied across various subjects and learning materials.
	29	I can adapt the use of AI in various classroom situations.
	30	I am confident in my ability to use AI effectively in planning, implementing, and evaluating learning based on my previous learning experiences.
Strength Strength belief moment face obstacle	31	I remain confident in my ability to use AI in learning even after experiencing technical failures.
	32	I do not give up easily when facing difficulties in integrating AI into learning.
	33	I remain confident that I can adjust my strategies for using AI in learning after conducting evaluations.

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RESULT

This study involved 131 students from the Faculty of Education at XYZ University, consisting of 59 students from the 2023 cohort and 72 students from the 2024 cohort, representing various study programs. The participants ranged in age from 19 to 26 years and belonged to Generation Z. All respondents had prior teaching experience through microteaching and teaching practicum activities and had been exposed to and used generative AI. Most respondents (53%) were categorized as frequent AI users, primarily using AI to develop learning materials, lesson plans, instructional media, and assessments. Although respondents' level of trust in AI-generated outputs tended to be neutral and most of them regularly verified AI-generated information, the mean scores of all variables were classified as high. This finding indicates that the pre-service teachers demonstrated high levels of AI Literacy, self-efficacy, and TPACK-based teaching readiness, although their level of AI Anxiety was also relatively high.

In the outer model assessment, validity was examined using the Average Variance Extracted (AVE) and Heterotrait-Monotrait Ratio (HTMT), while reliability was assessed through Composite Reliability and rho-a.

Table 5. Results of Validity and Reliability Tests

Variables	AVE	HTML	Information	Rho-a	Information
AI *Anxiety*	0.672		Valid	0.809	Reliable
AI *Literacy*	0.659		Valid	0.944	Reliable
Readiness teach TPACK- based	0.600		Valid	0.962	Reliable
Self-efficacy	0.611		Valid	0.924	Reliable
AI *Literacy* – AI *Anxiety*		0.630	Valid		
Readiness teach TPACK- based – AI *Anxiety*		0.247	Valid		
Self-efficacy – AI *Anxiety*		0.269	Valid		
Readiness teach based on TPACK – AI *Literacy*		0.350	Valid		
Self-efficacy – AI *Literacy*		0.404	Valid		
Self-efficacy – Readiness teach TPACK-based		0.790	Valid		

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The AVE results indicate that all constructs are valid because they meet the criterion of an AVE value greater than 0.50. Furthermore, all HTMT values among the constructs are below 0.90, indicating adequate discriminant validity, meaning that the indicators represent their respective constructs more strongly than other constructs. In addition, all constructs have reliability values greater than 0.70, indicating that the instruments possess adequate accuracy, consistency, and precision in measuring the constructs and are therefore suitable for further analysis (Hamid & Anwar, 2019).

The inner model assessment involved structural model evaluation through the examination of the Variance Inflation Factor (VIF) and R-square values.

Table 6. VIF Test Results

Hypothesis	VIF
AI *Anxiety* → Readiness Teach TPACK Based	1,425
AI *Anxiety* -→ *Self-Efficacy*	1,424
AI *Literacy* → Readiness Teach TPACK Based	1,594
AI *Literacy* → *Self-Efficacy*	1,424
Self-Efficacy → Readiness Teach TPACK Based	1,185

Based on the results, all VIF values were below 5.00, indicating that no multicollinearity issues existed among the predictor variables.

Table 7. *R-Square Test Results*

Endogenous Variables	R-square	R-Square Adjusted
Readiness Teach TPACK Based	0.570	0.560
Self-Efficacy	0.156	0.143

The R-square value for TPACK-based teaching readiness was 0.570, which falls within the moderate category. This result indicates that 57.0% of the variance in TPACK-based teaching readiness can be explained by the variables included in the model. Meanwhile, the R-square value for self-efficacy was 0.156, which falls within the weak category because it is below 0.25. This finding indicates that only 15.6% of the variance in self-efficacy can be explained by the variables included in the model.

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Table 8. Results of *the Boothstrapping Direct* and *Indirect Effect Test*

Hypothesis		Original sample	T-statistics	P-values	Note
AI *Anxiety* → Readiness Teach TPACK Based	H1	0.032	0.411	0.340	Not proven
AI *Literacy* → Readiness Teach TPACK Based	H2	0.043	0.531	0.298	Not proven
AI *Anxiety* → *Self-Efficacy*	H3	0.027	0.273	0.392	Not proven
AI *Literacy* → *Self-Efficacy*	H4	0.379	3,348	0.000	Proven
Self-Efficacy→ Readiness Teach TPACK Based	H5	0.728	10,171	0.000	Proven
AI *Anxiety* → *Self-Efficacy* → Readiness Teach TPACK Based	H6	0.020	0.274	0.392	Not proven
AI *Literacy* → *Self-Efficacy* → Readiness Teach TPACK Based	H7	0.276	3,453	0.000	Proven

The hypothesis testing results indicate that Hypotheses 1, 2, 3, and 6 were not supported, whereas Hypotheses 4, 5, and 7 were supported.

The interview findings from five participants revealed that the high level of AI Anxiety among pre-service teachers at XYZ University was not debilitating in nature. Instead, it was interpreted as responsible-driven anxiety, namely anxiety driven by a sense of responsibility and integrity to ensure that information generated by AI is valid and can be responsibly conveyed to students. Furthermore, this form of anxiety encouraged students to continuously learn and utilize AI more wisely and effectively while remaining aligned with the integrity of their Christian faith. The findings also indicate that AI integration at XYZ University still largely depends on the policies and practices of individual lecturers.

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DISCUSSION

Hypotheses 1, 3, and 6 indicate that AI Anxiety does not have a significant effect on TPACK-based teaching readiness, either directly or indirectly. These findings may be attributed to the fact that the AI Anxiety construct was no longer fully represented due to the elimination of several dimensions and indicators during the measurement model assessment. Nevertheless, the interview findings revealed that the AI Anxiety experienced by pre-service teachers at XYZ University is not interpreted as fear of being replaced by AI or an inability to use technology. Rather, it is perceived as responsible-driven anxiety, which refers to a sense of responsibility to ensure that information generated by AI can be justified and appropriately delivered to students. This form of anxiety also functions as a positive coping mechanism in which students do not avoid AI but are instead encouraged to learn more actively and utilize AI in educational contexts. This finding is consistent with previous studies suggesting that AI Anxiety is not always debilitating but may also foster adaptive behaviours (Wang et al., 2024). Furthermore, the high level of AI Anxiety accompanied by high levels of self-efficacy and TPACK-based teaching readiness indicates a tendency toward AI Engagement, which is characterized by curiosity, exploration, and deeper interaction with AI technologies (Vreede et al., 2024, p. 168).

Hypothesis 2 demonstrates that AI Literacy does not significantly influence TPACK-based teaching readiness directly but exerts a positive effect through the mediation of self-efficacy (Hypothesis 7). This finding is further supported by Hypothesis 4, which indicates that AI Literacy has a positive and significant effect on self-efficacy, and Hypothesis 5, which shows that self-efficacy has a positive and significant effect on TPACK-based teaching readiness, with the highest t-statistic among all tested hypotheses. These findings suggest that students' AI Literacy has not yet been fully integrated into pedagogical practice due to limited teaching experience and varying levels of AI integration across lecturers and courses. Interestingly, self-efficacy plays a crucial role as a full mediator. This finding aligns with Bandura's Social Cognitive Theory and the study by Fitriana (2025, p. 203), which explains that knowledge and positive attitudes toward AI do not automatically lead to effective implementation. Instead, individuals require self-efficacy as a mechanism that bridges technological knowledge and its application in educational practice. Therefore, self-efficacy emerges as a key factor connecting AI Literacy and TPACK-based teaching readiness among pre-service teachers.

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CONCLUSION

This study demonstrates that AI Anxiety does not significantly influence either TPACK-based teaching readiness or self-efficacy, either directly or indirectly through the mediation of self-efficacy. Interview findings indicate that anxiety toward AI is better understood as responsible-driven anxiety, namely a sense of vigilance and responsibility in using AI appropriately and ethically, which may even lead to AI Engagement that encourages continuous exploration and learning. On the other hand, AI Literacy does not directly influence TPACK-based teaching readiness. However, it positively influences self-efficacy, which in turn positively affects TPACK-based teaching readiness and serves as a full mediator in the relationship between AI Literacy and TPACK-based teaching readiness. Therefore, TPACK-based teaching readiness among pre-service teachers cannot be developed solely through AI knowledge; it also requires confidence in one's ability to integrate technology pedagogically into the teaching and learning process.

FUTURE DIRECTIONS

Practically, improving pre-service teachers' TPACK-based teaching readiness requires strengthening both AI Literacy and self-efficacy. This can be achieved by encouraging the critical, ethical, and responsible use of AI and by promoting more structured AI integration within curricula, assignments, training programs, and lecturer mentoring. Furthermore, future research is recommended to develop more valid and reliable instruments, particularly for measuring AI Anxiety, and to explore AI integration in education using more comprehensive approaches, such as mixed-method designs, observational measures rather than self-perception instruments, and the inclusion of values and spiritual character as potential moderating variables influencing TPACK-based teaching readiness.

REFERENCES

Alshorman, Sameera. "Kesiapan Menggunakan AI dalam Pengajaran Sains: Perspektif Guru Sains." *Jurnal Pendidikan Sains Baltik, Vol. 23, No. 3* , (2024): 432-448.

Akgoz, Ersin Eren, Fatih Sahin, dan Emre Sonmez. "Menjelajahi Keyakinan Efikasi Diri dan Perilaku Hambatan Diri Calon Guru dalam Konteks Budaya Universitas." *Inquiry in Education, Vol.17* , (2025): 1-18.

Ariyani, Distia Eka Putri, and Riza Yonisa Kurniawan. "Analisis Faktor yang Mempengaruhi Kesiapan Mahasiswa Calon Guru Menjadi Tenaga Pendidik Profesional." *Edukatif: Jurnal Ilmu Pendidikan, Vol.6, No.5*, (2024): 6197-6206.

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BRIN, HUMAS. *BRIN Temukan Tantangan dan Peluang Guru Indonesia di Era AI.* 24 Oktober 2025. https://www.brin.go.id/news/125331/brin-temukan-tantangan-dan-peluang-guru-indonesia-di-era-ai (diakses 15 Januari 2026).

Carolus, Astrid, Martin Koch, Samantha Straka, Marc Erich Latoschik, dan Carolin Wienrich. "MAILS - Skala Literasi Meta AI: Pengembangan dan Pengujian Kuesioner Literasi AI Berdasarkan Model Kompetensi yang Teruji dan Kompetensi Perubahan dan Meta Psikologis." *Komputer dalam Perilaku Manusia: Manusia Buatan* , (2023): 1-10.

Cetin, Oguz, dan Gizem Celen. "Investigasi Literasi Kecerdasan Buatan Calon Guru dan Pandangan tentang Penggunaan Kecerdasan Buatan dalam Pendidikan." *JESEH: Jurnal Pendidikan dalam Sains, Lingkungan dan Kesehatan, 11(4)* , (2025): 285-304.

Fitriana, Nurin. "Memberdayakan Literasi, Motivasi, dan Efikasi Diri Kecerdasan Buatan untuk Pendidikan: Studi SEM." *Jurnal Pendidikan dan Pengembangan Manusia, Vol. 10, No. 2* , (2025): 202-219.

Gani, Mega Ambarwati Abdul, Nadya Putri Saylendra, dan Yogi Nugraha. "Analisis Kesiapan Mengajar Siswa Setelah Implementasi Pengenalan Lapangan Persekolahan." *Pijar: Jurnal Penelitian Bidang Pendidikan dan Pembelajaran* , (2023): 72-79.

Hamid, Rahmad Solling, dan Suhardi Anwar. *Structural Equation Modeling (SEM) Berbasis Varian: Konsep Dasar dan Aplikasi dengan Program SmartPLS 3.2.8 dalam Riset Bisnis.* Jakarta: PT Inkubator Penulis Indonesia, 2019.

Hamiddin, Febti Ismiatun, Yuli Ismi Nahdiyati Ilmi, and Helmi Wicaksono. "Teacher competencies and their role in promoting pre-service teachers' professional growth." *Journal of Research on English and Language Learning, Vol. 7, No.1*, (2025): 39-51.

Javaid, Muhammad Sohail, Muhammad Adnan Riaz, Rana Basharat Faraz, Aisha Sajjad, dan Hafiz Nabeel Ahamad. "Pengaruh Stres Teknologi, Kecemasan AI, dan Kepemimpinan Digital terhadap Niat Adopsi AI: Meneliti Peran Mediasi Efikasi Diri Teknis dan Efek Moderasi Budaya Inovatif." *Jurnal Arsip Ilmu Sosial Lanjutan, Vol.4, No.1* , (2025): 3422-3439.

Kun, Qi. "Persepsi dan Kesiapan Guru dalam Mengintegrasikan Platform Pembelajaran Berbasis AI ke dalam Praktik Kelas Bahasa Mandarin." *Jurnal Uniglobal Ilmu Sosial dan Humaniora Vol. 4* , (2025): 161-167.

Kuzu, Cigdem Inci. "Literasi AI guru matematika, kecemasan, dan persepsi integrasi AI dalam pendidikan matematika: studi metode campuran." *BMC Psychology* , (2026): 1-19.

Laru, Jari, Ismail Celik, Iiris Jokela, and Kati Makitalo. "The antecedents of pre-service teachers' AI literacy: perceptions about own AI driven applications, attitude towards AI and knowledge

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in machine learning." *European Journal of Teacher Education*, (2025): 1-23.

Morales-Garcia, Wilter, Liset Sairitupa-Sanchez, Alcides Flores-Paredes, Jai Pascual-Marino, dan Mardel Morales-Garcia. "Pengaruh Efikasi Diri dalam Penggunaan Kecerdasan Buatan (AI) dan Kecemasan Terhadap Penggunaan AI pada Ketergantungan AI di Kalangan Mahasiswa Universitas Peru." *Data & Metadata* , (2024): 1-11.

Ozden, Mehtap, Funda Orge Yasar, and Engin Meydan. "The Relationship Between Teachers' Self-Efficacy Beliefs and Their Self-Efficacy in Developing Digital Materials." *Educational Policy Analysis and Strategic Research, Vol.19, No.4*, (2024): 28-43.

Patterson, Carmel, and Shani Hartley. "Pre-service teacher preparedness for their profession: a systematic review of the literature." *The Australian Education Researcher* , (2026): 1-24.

Puspa, Anastasia Audrey Levina, dan Vincent Suryawidjaja. "Analisis Kemampuan TPACK Calon Guru melalui Microteaching Lesson Study." *Jurnal Penelitian Pendidikan, Psikologi dan Kesehatan, Vol.6, No.4* , (2025): 1402-1409.

Rukminingsih, Gunawan Adnan, dan Mohammad Adnan Latief. *Metode Penelitian Pendidikan: Penelitian Kuantitatif, Penelitian Kualitatif, Penelitian Tindakan Kelas.* Yogyakarta: Erhaka Utama, 2020.

Sari, Desy Kumala, Supahar, Dadan Rosana, Pri A Dinata, dan Muhammad Istiqlal. "Mengukur literasi kecerdasan buatan: Perspektif mahasiswa pendidikan tinggi Indonesia." *Jurnal Penelitian Pedagogi, Vol.9, No.2* , (2025).

Suartini, Kinkin, Adriansyahroni, Nyaman, Riyadi, dan Iva Sarifah. "Meta-Analysis: Hubungan antara Self-Efficacy dan Academic Achievement." *Jurnal Ilmu Sosial dan Pendidikan (JISIP), Vol.7, No.3* , (2023): 2475-2480.

Subasman, Iman, dkk. *Metode dan Teknik Penelitian Kuantitatif, Kualitatif, dan Pengembangan untuk Mahasiswa.* Bandung: Widina Media Utama, 2025.

Supriyono, Ignatius Agus, dkk. *Kiat Sukses Panduan SmartPLS: dari Data hingga Publikasi Bereputasi.* Tangerang: Asosiasi Pendidikan Tinggi Informatika dan Komputer (APTIKOM), 2024.

Surayanah, Imam Rofiki, dan Audiza Assyifa Ramila. *Pembelajaran Berbasis TPACK dalam Pengelanan Literasi Numerasi.* Lamongan, Jawa Timur: Publikasi Akademisi, 2024.

Surya, Maulidina Rahmawati, Muhammad Bachtyar Rosyadi, dan Inung Diah Kurniawati. "Pengaruh Media Pembelajaran E-Learning Terhadap Mutu Nilai Mahasiswa Sistem Informasi ITB Tuban." *Teknologi Transformasi Digital (Digitech), Vol.4, No.1* , (2024): 452-460.

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Vreede, Triparna de, GJ de Vreede, Vivek Singh, dan Paul Spector. "Pengaruh Keterlibatan AI pada Adopsi AI Generatif." *Konferensi Internasional Hawaii tentang Ilmu Sistem* , (2024).

Wang, Yu-Min, Chung-Lun Wei, Hsin-Hui Lin, Sheng-Ching Wang, dan Yi-Shun Wang. "Apa yang mendorong perilaku belajar AI siswa: perspektif kecemasan AI." *Lingkungan Pembelajaran Interaktif, Vol. 32* , (2022): 1-17.

Wang, Kai, Qianqian Ruan, Xiaoxuan Zhang, Chunhua Fu, dan Boyuan Duan. "Kecemasan GenAI, Efikasi Diri Teknologi, dan TPACK pada Calon Guru: Hubungan Strukturalnya dengan Niat Perilaku untuk Merancang Pengajaran Berbantuan GenAI." *Ilmu Perilaku* , (2024): 1-21.

Yusuf, Irsyadah, Nadia Elfa Riska, dan Agung Setyawan. "Kesiapan Guru Sekolah Dasar dalam Menghadapi Transformasi Digital Pendidikan review dari Kerangka Technological Pedagogical Content Knowledge (TPACK)." *Jurnal Ilmiah Multidisipliner, Vol.3, No.4* , (2025): 2140-2148.

Zaki, Ahmad Rifian Maula, dan Indana Ainiya Ulya. "Analisis Kesiapan Pedagogis dan Teknologis Guru dalam Mengadopsi AI sebagai Sarana Pembelajaran Adaptif." *Jurnal Pendidikan Indonesia, Vol. 6, No.7* , (2025): 3220-3228.

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