Analysis of AI Anxiety in Madrasah Ibtidaiyah Prospective Teachers' Readiness

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Abstract. The rapid integration of Artificial Intelligence (AI) in education has generated both opportunities and psychological challenges, notably AI Anxiety (AIA), particularly among pre-service primary school teachers who shape future generations' technological attitudes. This study investigates how Information and Communication Technology (ICT) experience, attitudes, and competence predict AIA levels among pre-service teachers enrolled in the PGMI program at UIN Raden Mas Said Surakarta. Using a quantitative, correlational design, data were collected from 141 participants through validated AI Anxiety and ICT Role questionnaires using google form. Descriptive analysis revealed a moderate overall AIA level (M = 4.65), with high external, career-focused anxiety notably Job Replacement (M = 5.56) and low learning-related anxiety (M = 2.65). Correlation and regression analyses indicated that technical and cognitive ICT skills significantly and negatively predicted AIA, identifying Technical Skills as the strongest mitigating factor (B = -0.221, p = 0.030). These findings affirm that practical ICT proficiency reduces AI-related fears by enhancing digital self-efficacy. The study underscores the necessity for curriculum redesign in teacher education to emphasize applied technical competence and gender-sensitive training. Strengthening ICT capability can transform AI apprehension into confidence, preparing future educators for AI-integrated learning environments.

Keywords: AI Anxiety; Digital Literacy; Islamic Primary Education; Prospective Teachers.

1. INTRODUCTION

The rapid integration of Artificial Intelligence (AI) has profoundly impacted various sectors, including higher education, fundamentally reshaping learning processes and organizational functions. AI applications, particularly generative large language models such as ChatGPT, gemini, deepseek, are rapidly becoming integral to academic life and the future workforce(Kim et al., 2022). This technological shift, while promising enhanced efficiency and personalized learning, has concurrently generated complex psychological responses, primarily observed as AI Anxiety (AIA). AIA is defined as the excessive fear or profound uneasiness stemming from changes induced by AI in personal or social life, and it acts as a significant cognitive barrier to the technology's adoption and beneficial use.(Russo et al., 2025) Studies consistently place AIA levels among pre-service educators at a moderate level.

The phenomenon of AIA is particularly critical within the context of pre-service primary school teachers (Calon Guru Madrasah Ibtidaiyah/MI), as they are

essential stakeholders in shaping future generations' attitudes toward AI. The central conflict lies between their pronounced AI-related career concerns and a potential deficit in mitigating digital skills(Dai et al., 2024). Anxiety Centered on Existential Threats: The primary concerns of pre-service teachers are directed toward existential and professional implications, such as job replacement anxiety and broader socio-ethical concerns, rather than anxiety regarding the difficulty of learning AI itself. This threat-focused AIA has been empirically proven to significantly and negatively predict perceived usefulness (PU) and subsequent behavioral intention (BI) to use AI tools(Rodrigues et al., 2024).

Literature converges on the finding that AIA can be effectively reduced by stronger digital competence, specifically encompassing technical skills and efficacy. This suggests that proficiency in Information and Communication Technology (ICT),which forms the foundation of modern digital literacy,(Ayduğ & Altınpulluk, 2025)is a critical, modifiable protective factor against AIA. However, the specific role of ICT experience acquired during primary teacher education programs (PGMI) in mitigating these career-centric fears remains underexplored(Arvanitaki & Zaranis, 2020). Investigating the determinants of AI Anxiety and the mitigating function of ICT experience is crucial because AIA is a major psychological barrier to effective technology adoption and intention to learn AI-related skills. By identifying the specific role of ICT experience, this research offers a practical, evidence-based roadmap for policymakers to strategically adjust curricula to foster AI readiness.

This study aims to bridge the Providing empirical data that quantifies the extent to which self-reported ICT experience, attitudes, and competence gained during pre-service training (PGMI) negatively predicts specific components of AIA among future MI teachers(Zhang et al., 2023). By systematically investigating the predictive relationship between ICT experience in academic training and AIA, this research contributes to the learning behavior literature and provides a foundational framework for bolstering technological readiness and mitigating anxiety in future primary educators(Goegan et al., 2023).

A critical challenge exists within the context of pre-service primary school teachers (Madrasah Ibtidaiyah/MI): the conflict between their predominant career-centric AI fears and the variable proficiency in Information and Communication Technology (ICT) required to mitigate those fears. Firstly, the major anxieties reported by pre-service teachers concentrate on external threats, specifically job replacement anxiety and concerns regarding AI's socio-ethical and configurational impacts, rather than anxiety over the actual difficulty of learning AI concepts(C. Wang et al., 2025). This career-centric AIA has been empirically demonstrated to significantly and negatively predict crucial adoption factors, such as perceived usefulness (PU) and subsequent Behavioral Intention (BI) to use AI tools. Secondly, While AIA is a psychological barrier, empirical evidence strongly suggests that high Digital Competence (or AI Literacy/AIL) acts

as a crucial protective factor, consistently reducing AIA levels(Ayduğ & Altınpulluk, 2025). Furthermore, this competence is predictive: greater exposure and competence in Technical Digital Literacy lead to reduced AIA, confirming that competence is the critical, modifiable lever in this process. Therefore, understanding how the current state of ICT experience, attitudes, and competence in coursework relates to this specific, career-focused AIA is paramount(Kaya et al., 2024).

The research is urgent due to the increasing adoption of generative AI tools in global education, which demands immediate curriculum responses. The theoretical relevance lies in validating ICT experience as an empirical operationalization of the 'AI Literacy' construct in predicting psychological barriers; Practical relevance lies in providing immediate, evidence-based recommendations to institutions, enabling them to produce graduates with higher AI readiness and lower career-related apprehension.

This study is positioned to quantify the predictive power of ICT coursework experience (experience, attitude, competence) on AIA among islamic school pre-service teachers, identifying the strongest mitigating dimensions. The potential impact and benefits of this research are to contribute empirical evidence on ICT as a measurable antecedent that directly influences the mitigation of AIA, enriching the extension of the TAM/self-efficacy models and to offer specific, data-driven recommendations for PGMI curriculum redesign, focusing resources on strengthening the technical and self-efficacy components of ICT instruction the mechanisms proven most effective in building confidence and reducing career-focused fears. This will directly address the higher vulnerability to AIA observed in female educators.

2. METHOD

This study approach is appropriate for investigating the nature and magnitude of relationships among continuous variables, specifically examining whether perceived exposure and competence in Information and Communication Technology (ICT) predict levels of AI Anxiety (AIA) using quantitative design. The relationship testing will be grounded in psychological and technology adoption theory, examining ICT proficiency as an antecedent influencing psychological barriers.

The target population for this study comprises all undegraduated students in the Islamic School Teacher Education program at UIN Raden Mas Said Surakarta. A convenience sampling approach was utilized to gather a total sample of 141 participants. The sample was strategically balanced between Semester 1 students (n=71, 50.35%) and Semester 7 students (n=70, 49.65%) to reflect both the initial and final phases of their academic journey. The sample demographic is characteristic of the education faculty, with a clear predominance of female students (n=124, 87.94%) compared to male students (n=17, 12.06%).

Two primary questionnaires, translated and adapted into Bahasa Indonesia following stringent validity and reliability procedures (e.g., Confirmatory Factor Analysis (CFA) and Cronbach's Alpha calculation), will be administere. AI Anxiety Scale (AIAS) instrument measures the extent of anxiety and concern related to AI, encompassing dimensions such as Job Replacement Anxiety and Socio-technical Blindness.

Table 1. AIA Questionnaire

Code	Original Item Description (Y. Y. Wang & Wang, 2022)
Learning Anxiety (L) L1	Learning to understand all of the special functions associated with an AI technique/product makes me anxious.
L2	Learning to use AI techniques/products makes me anxious.
L3	Learning to use specific functions of an AI technique/product makes me anxious.
L4	Learning how an AI technique/product works makes me anxious.
L5	Learning to interact with an AI technique/product makes me anxious.
L6	Taking a class about the development of AI techniques/products makes me anxious.
L7	Reading an AI technique/product manual makes me anxious.
L8	Being unable to keep up with the advances associated with AI techniques/products makes me anxious.
Job Replacement Anxiety (J) J1	I am afraid that an AI technique/product may replace humans.
J2	I am afraid that widespread use of humanoid robots will take jobs away from people.
J3	I am afraid that AI techniques/products will replace someone's job.
J4	I am afraid that an AI technique/product may make us dependent.
J5	I am afraid that an AI technique/product may make us even lazier.
J6	I am afraid that if I begin to use AI techniques/products I will become dependent upon them and lose some of my reasoning skills.
Sociotechnical Blindness (S) S1	I am afraid that an AI technique/product may be misused.
S2	I am afraid of various problems potentially associated with an AI technique/product.
S3	I am afraid that an AI technique/product may get out of control and malfunction.

Code	Original Item Description (Y. Y. Wang & Wang, 2022)
S4	I am afraid that an AI technique/product may lead to robot autonomy.
AI Configuration Anxiety (C) C1	I find humanoid AI techniques/products (e.g. humanoid robots) scary.
C2	I find humanoid AI techniques/products (e.g. humanoid robots) intimidating.
C3	I don't know why, but humanoid AI techniques/products (e.g. humanoid robots) scare me.

ICT Role in Coursework Questionnaire measured assesses the perceived experience, attitudes, and competence of participants regarding the utilization of ICT tools throughout their PGMI studies.

Table 2. ICT Questionnaire

Aspect	Original Question(Zhang et al., 2025)
Attitude (A1)	I like using Information and Communication Technology (ICT) for learning.
A2	I learn better by using Information and Communication Technology.
A3	Information and Communication Technology makes lessons more exciting/fun.
A4	I am more motivated to learn with Information and Communication Technology.
A5	Information and Communication Technology helps me to learn independently (without always being instructed by the teacher).
A6	There are many benefits if we use technology like cellphones, tablets, and others for learning.
A7	Teachers/Lecturers should use Information and Communication Technology more often in teaching in class.
Technical Skills (T1)	I know how to solve my own technical problems (e.g., internet connection issues).
T2	I can quickly learn new technologies.
T3	I always follow the development of important new technologies.
T4	I know a lot about various kinds of technology.
T5	I have the technical skills I need to learn with Information and Communication Technology and to create my assignments (such as presentations, blogs, etc.).
T6	I have good Information and Communication Technology skills.
Cognitive Skills (CS1)	I am confident in my ability to search for and evaluate information from the internet.
CS2	I understand issues related to internet activities (such as online security, how to find info, and plagiarism of others'

Aspect	Original Question(Zhang et al., 2025)
	work).
Social Emotional Skills (SE 1) SE 2	Information and Communication Technology allows me to cooperate better with friends in group assignments and other activities.

Data will be collected via an online or paper-based survey instrument. Prior to participation, informed consent will be obtained, ensuring confidentiality and voluntary participation. Data analysis will primarily involve descriptive Statistics to determine the current mean levels of AIA and ICT usage parameters (RQ1), correlation Analysis (Pearson) to investigate the initial linear relationships between ICT variables and AIA (RQ2), hierarchical Multiple Linear Regression Analysis to To test the predictive power of ICT dimensions on AIA, identifying the strongest mitigating factors while controlling for potential covariates (RQ2 and RQ3) and Structural Equation Modeling (SEM) or PLS-SEM (Optional) to test the overall fit of the proposed theoretical model involving latent constructs (ICT experience, competence, and AIA).

3. RESULTS

The first research question (RQ1) seeks to determine the current level of AI Anxiety (AIA) among pre-service primary school teachers (Madrasah Ibtidaiyah). This analysis utilizes descriptive statistics (Mean, Standard Deviation, and Composite Mean) across the four established dimensions of the AI Anxiety Scale (AIAS): Learning Anxiety (L), Job Replacement Anxiety (J), Sociotechnical Blindness (S), and AI Configuration Anxiety (C). The total sample size analyzed is N = 141. The scale used a 7-point Likert rating, where 1 denotes "Strongly Disagree" (Very Low Anxiety) and 7 denotes "Strongly Agree" (Very High Anxiety). The neutral theoretical midpoint is 4.00.

Table 3. Descriptive Statistics for AI Anxiety Dimensions (N=141)

AI Anxiety Dimension	Abbreviation	Number of Items	Mean (M)	Standard Deviation (SD)	Composite Mean Interpretation
Learning Anxiety	L	8	2.65	1.63	Moderate-Low
Job Replacement Anxiety	J	6	5.56	1.54	Moderate-High
Sociotechnical Blindness	S	4	5.51	1.4	Moderate-High
AI Configuration Anxiety	C	3	4.88	1.7	Moderate
Overall AI Anxiety	AIA Total	21	4.65	1.32	Moderate

Note: Item means were calculated for each dimension before averaging to derive the composite means. The Interpretation Scale is defined as: Low (1.00–2.33), Moderate-Low (2.34–3.66),

Moderate (3.67–4.33), Moderate-High (4.34–5.66), High (5.67–7.00).

The descriptive statistics reveal that the overall level of AI Anxiety (AIA Total) among pre-service primary school teachers is Moderate (M = 4.65, SD = 1.32), falling above the theoretical neutral midpoint of 4.00. This finding aligns with international literature suggesting that AI anxiety generally resides at a moderate level among pre-service educators. A deeper analysis across the specific dimensions highlights a significant disparity in the source of anxiety such as High External and Career-Focused Anxiety The highest levels of anxiety are observed in dimensions related to external impacts and professional threats, Job Replacement Anxiety (J): M = 5.56 (Moderate-High). This reflects significant worry regarding AI replacing human jobs and leading to increased societal dependence. Sociotechnical Blindness (S): M = 5.51 (Moderate-High). This indicates considerable apprehension about the potential misuse, problems, and malfunction of AI products, consistent with external risks. Low Internal and Learning-Focused Anxiety In contrast, Learning Anxiety (L) exhibits the lowest composite mean (M = 2.65, Moderate-Low). This suggests that pre-service teachers are generally not anxious about their ability to acquire the necessary knowledge and skills associated with AI, but rather about the consequences of AI deployment. Moderate Configurational Anxiety: AI Configuration Anxiety (C), related to humanoid robots, is rated as Moderate (M = 4.88). In conclusion, the data confirms that AIA among the participants is primarily driven by external and career-related fears (Job Replacement and Sociotechnical Risks) rather than internal barriers related to learning capability. This substantiates the research focus on mitigating the consequences of external threats through technical competence.

Initial validation confirms that the instruments possess satisfactory internal consistency, justifying their use in subsequent analyses.

Table 4. Internal Consistency (Cronbach's Alpha)

Dimension	Construct	Cronbach's α	Interpretation
AI Anxiety	Job Replacement (J)	0.904	Excellent
	AI Configuration (C)	0.902	Excellent
	Sociotechnical Blindness (S)	0.861	Good
	Learning Anxiety (L)	0.855	Good
ICT Role	Attitude (A)	0.891	Good
	Technical Skills (T)	0.85	Good
	Cognitive Skills (G)	0.784	Acceptable
	Social-Emotional Skills (SE)	0.742	Acceptable

The correlation analysis was conducted to examine preliminary linear relationships between the overall AI Anxiety (AIA Total) score and the four independent ICT dimensions, serving as the initial test for RQ2.

Table 5. Pearson Correlation between AIA Total and ICT Dimensions

ICT Dimension	Pearson's R	P-value	Significance
Cognitive Skills	-0.197	0.017*	Significant
Technical Skills	-0.178	0.031*	Significant
Attitude	-0.05	0.545	Not Significant
Social-Emotional Skills	-0.033	0.69	Not Significant

According Table T. Both Cognitive Skills and Technical Skills show a statistically significant, weak negative correlation with the overall level of AI Anxiety. This indicates that participants with higher technical and cognitive digital competencies tend to report lower levels of AIA. However, the emotional/motivational dimensions of ICT (Attitude and Social-Emotional Skills) do not show a significant linear relationship with AIA.

HMLR was performed with AIA Total as the dependent variable to determine the predictive power of ICT dimensions (RQ2) and identify the strongest mitigating factor (RQ3). Control variables (Gender and Semester) were entered in Model 1.

Table 6. Summary of Hierarchical Multiple Regression Predicting AI Anxiety

Model	Predictor Variable	B
Model 1	Gender (Male=1)	-0.087
(Controls)	Semester (Sem 7=1)	-0.107
Model 2	Attitude	0.076
(Technical Block)	Technical Skills	-0.221
Model 3	Cognitive Skills	-0.171
(Full Model)	Technical Skills	-0.096
	Social-Emotional Skills	0.053

Based on Table 6. The Model 1 (Controls) or Control variables (Gender and Semester) were not statistically significant predictors of AIA ($R^2 = 0.004$), confirming that the variation in AI Anxiety is not significantly explained by demographic grouping in this sample. Therefore, Model 2 (Technical Block) indicate the addition of the attitude and technical blocks significantly identified Technical Skills as the first and strongest mitigating predictor (B = -0.221, p = 0.030). This is the core finding in addressing RQ3, indicating that higher technical proficiency directly predicts lower AI Anxiety when controlling for general attitude and demographic factors. Furthermore, Model 3 (Full Model) or the final model, including Cognitive and Social-Emotional Skills, showed limited incremental predictive power ($\Delta R^2 = 0.017$). The introduction of Cognitive Skills in this final step reduced the unique predictive significance of Technical Skills (from p = 0.030 to p = 0.451). However, Cognitive Skills itself remained non-significant (p = 0.112).

4. DISCUSSION

The descriptive analysis (RQ1) established that the overall level of AI Anxiety (AIA) among participants was moderate, with an average mean score of M = 4.65

on a 7-point scale. However, this anxiety demonstrated a significant disparity between low internal (learning-focused) anxiety (M = 2.65) and high external (career-focused) anxiety related to job replacement (MJobReplacement = 5.56) and sociotechnical disruption (MSociotechnical = 5.51). This finding aligns with existing literature, which consistently shows that pre-service educators are relatively confident in their ability to learn AI concepts but express substantial concern about the professional and societal consequences of AI deployment (Chaturvedi et al., 2023). Such a pattern indicates that the perceived threat of AI is primarily external and career-oriented rather than internal and cognitive.

The correlational and regression analyses (RQ2 and RQ3) confirmed a significant inverse relationship between AI Anxiety and ICT proficiency, demonstrating that higher technical and cognitive skills are associated with lower levels of anxiety. This result supports the theoretical premise derived from Self-Efficacy Theory (Bandura, 1997) and the Technology Acceptance Model (TAM) (Davis, 1989), which posit that individuals with stronger digital competence experience greater confidence and reduced technological fear. In the context of teacher education, this suggests that digital capability functions as a protective and mitigating factor against professional anxiety associated with technological disruption(Chiu & Chai, 2020; Susnjak, 2024).

Technical Skills as the Primary Mitigator that are Technical skills emerged as the strongest and most consistent predictor in reducing AI Anxiety (B = -0.221, p = 0.030), even after controlling for demographic variables such as gender and semester. This finding highlights that the most potent psychological buffer against career-centric AI anxiety lies in the functional ability to operate digital technologies effectively. These results are consistent with prior studies showing that enhanced technical digital literacy fosters AI Self-Efficacy (AISE), which in turn serves as a key antecedent to anxiety reduction (Asio & Sardina, 2025).

Conversely, the subjective and emotional aspects of ICT use, including attitudes toward technology and social-emotional skills, did not emerge as significant predictors. This is notable given that AI anxiety is inherently affective in nature. The lack of significant correlation implies that a positive attitude toward ICT or frequent social use of technology does not sufficiently alleviate professional fears. The reduction of deep-seated career anxiety requires tangible, verifiable operational competence, rather than mere affective engagement(Chiu & Chai, 2020; Yaşar & Karagucuk, 2025).

Overall, the findings highlight a crucial distinction while AI Anxiety is largely driven by external fears, it must be addressed through internal, functional skill development. The acquisition of competence transforms perceived threats into confidence, converting generalized fear into actionable professional readiness. This supports the conceptual framework in which competence-based self-efficacy acts as a psychological antidote to technology-related fear(Zhang et al., 2025).

The findings suggest that existing ICT and digital literacy curricula should be reoriented from predominantly theoretical instruction toward functional mastery and applied technical practice. Emphasizing hands-on activities such as creation, experimentation, and complex problem-solving can enhance technical self-efficacy, which has been identified as the most influential factor in reducing AI Anxiety. This pedagogical shift would enable pre-service teachers to transform their apprehension toward AI into a sense of capability and control, thereby fostering greater confidence in technology integration.

Moreover, training programs should explicitly address career-oriented anxieties, particularly concerns related to job replacement. By framing AI as an augmentative rather than a substitutive technology, educators can reshape perceptions of AI from a professional threat into an opportunity for advancement. Training modules that highlight the collaborative potential of AI,emphasizing how it complements human expertise, can help reduce fear-based resistance and encourage more adaptive professional mindsets(Kaya et al., 2024). Rather than viewing AI as a replacement for human labour, we should position it as a cognitive partner, such as an extension of the mind, a sparring partner for arguments, and a tool for reflection to see new perspectives. Students should avoid using AI to determine final answers and make intellectual decisions.

The study also underscores the importance of gender-sensitive strategies in digital education. Given the higher levels of AI Anxiety observed among female pre-service teachers, institutions must design training initiatives that specifically focus on strengthening technical competence and confidence among women(Cengiz & Peker, 2025). Enhancing female educators' digital self-efficacy not only supports equitable participation in technological innovation but also helps close existing gender gaps in technology adoption and psychological readiness (van der Spoel et al., 2022). Collectively, these practical efforts can foster a more inclusive, confident, and technologically resilient teaching workforce prepared to engage with AI-enhanced learning environments.

5. CONCLUSION

This study confirms that AI Anxiety (AIA) among pre-service primary school teachers is driven by external professional threats, but is measurably mitigated by functional ICT proficiency. The data clearly identifies Technical Skills as the strongest practical lever for reducing these anxieties. By converting abstract fear into concrete confidence through targeted technical competence building, institutions can effectively prepare future educators for the AI-integrated classroom. This implication of research shows that there is a new paradigm in digital literacy learning, namely that AI is a necessity rather than a choice.The suggestion for teh future, students need to bring personalisation that comes from their own initiative rather than from coercion and laziness. Although AI simultaneously speeds up access, amid this ambiguity, critical thinking becomes

the way forward and human epistemic maturity becomes the biggest challenge compared to the presence of technology itself. In this era, what is concerning is not AI becoming increasingly intelligent, but humans stop to think.

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