

Anxiety and Self-efficacy Level in Artificial Intelligence (AI) Integration among Preservice Science Teachers

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Abstract

The rapid development of artificial intelligence (AI) has significantly influenced the educational sector, raising concerns about its psychological implications, particularly anxiety and its potential effect on preservice science teachers' self-efficacy in AI integration. However, limited studies have explored the relationship between these variables, especially in science education within the Philippine context. This study employed a descriptive-correlational research design utilizing total population sampling with adapted and validated survey questionnaires administered to 143 preservice science teachers from state universities in Tacloban City, Philippines. Mean and standard deviation were used for descriptive analysis, while Spearman rho was used for inferential analysis. Findings revealed a moderate overall anxiety level ($M=3.30$), with Sociotechnical Blindness ($M=3.88$) and Job Replacement ($M=3.47$) reaching high levels, while Learning ($M=2.73$) and AI Configuration ($M=3.12$) remained at moderate levels. The respondents demonstrated a high overall level of self-efficacy in AI integration ($M=3.81$), reflecting strong confidence in instructional AI use, although moderate levels were observed in AI-assisted classroom management and parental engagement. Correlation analysis revealed a statistically significant weak negative relationship between self-efficacy and the Learning ($r_s=-0.202$, $p=0.015$) and AI Configuration ($r_s=-0.200$, $p=0.017$) dimensions of anxiety, while the relationships with Job Replacement ($r_s=-0.074$, $p=0.377$) and Sociotechnical Blindness ($r_s=-0.058$, $p=0.491$) were negligible and not statistically significant. Self-efficacy showed a significant association with Learning and AI Configuration anxiety, but not with Job Replacement and Sociotechnical Blindness, suggesting that its relationship with anxiety is dimension-specific rather than uniform among preservice science teachers. A five-phase intervention program is proposed to holistically address the identified anxiety dimensions and sustain self-efficacy through activities covering AI skill building, ethics literacy, career orientation, humanoid AI exposure, and reflective teaching practice.

Keywords: AI integration, Artificial Intelligence, anxiety, preservice science teachers, self-efficacy

1. Introduction

Education is among the sectors most heavily influenced by the dynamic change in technology. The rapid advancement of artificial intelligence has significantly reshaped the educational sector, influencing how teaching and learning are delivered across the globe. Artificial intelligence is designed to mimic human characteristics and rational behavior, including perception, planning, reasoning, learning, and decision making, which has made it a valuable tool in educational settings (May, 2024). However, alongside these benefits, concerns have emerged regarding its impact on digital competence, social interaction, critical thinking, and academic ethics (Putri & Nafihima, 2025). Within the Philippine context, the integration of artificial intelligence in education is progressively accelerating, yet the psychological implications for future educators remain underexplored. Understanding how preservice science teachers perceive and respond to

artificial intelligence is essential, as they will be at the forefront of implementing these technologies in science classrooms.

With the increased integration and usage of AI in education, individuals have gradually begun expressing anxiety concerning AI, which impacts individual psychology as AI surpasses humans in various aspects (Li & Huang, 2020). One of the most pressing psychological implications accompanying AI integration is the emergence of AI anxiety which refers to the psychological unease and fear that individuals experience as a consequence of the rapid advancement of AI technologies (Kim et al., 2025). AI anxiety manifests through four interconnected dimensions: learning, job replacement, sociotechnical blindness, and AI configuration (Wang & Wang, 2022). In a study by Darancik et al. (2025), it was reported that there has been a moderate level of AI anxiety among German teacher candidates which can affect their pedagogy, such anxieties may cause a delay in AI integration, and in the long term they might avoid incorporating this tool to their pedagogical planning. Locally, Albino et al. (2025) reported a high rate of AI anxiety among college students in job replacement and sociotechnical blindness and a moderate level in AI configuration and learning, which involves AI anxiety in some areas.

The rapid evolution of AI has opened opportunities for learners and preservice teachers to integrate AI into educational settings, with studies showing that high self-efficacy beliefs contribute to the perception that AI can enhance teaching and learning (Sumandal, 2023). Self-efficacy is recognized as a key indicator of teaching technology integration (Zeng et al., 2022), and moderate self-efficacy levels have similarly been associated with positive attitudes toward AI and greater intention to learn among college students (Albino et al., 2025). However, alongside these opportunities, the swift advancement of AI also brings negative influences, particularly in the form of anxiety experienced by individuals across various fields. Despite the growing body of literature on AI anxiety and self-efficacy separately, studies examining the relationship between these two constructs remain limited, especially within the context of science education. Therefore, this study sought to address this gap by examining the relationship between anxiety dimensions and self-efficacy in AI integration among preservice science teachers in Tacloban City, Philippines.

Grounded in both Fear Acquisition Theory and Bandura's Self-Efficacy Theory, this study aims to fill the gap in lack of literature exploring the relationship between dimensions of anxiety and self-efficacy level in artificial intelligence integration among preservice science teachers for the school year 2025-2026. Specifically, the study aims to explore the dimensions of anxiety level in terms of Learning, Job Replacement, Sociotechnical Blindness and AI Configuration; the self-efficacy level in AI integration; the relationship between self-efficacy and dimensions of anxiety; and to develop a proposed intervention based on the findings of the study. The perspective of preservice science teachers needs to be explored for possible implications on teacher education program, psychological support, and professional growth.

2. Methodology

This section includes the design, locale, respondents, instruments used, data gathering procedure, analysis of data, and ethical consideration of the study.

2.1 Research Design

The study employed a quantitative, descriptive-correlational research design to examine variables, describe patterns, and assess associations (Creswell & Creswell, 2018). Specifically, the research sought to measure the relationship between various dimensions of anxiety and preservice science teachers' self-efficacy in AI integration, without assuming a cause-and-effect relationship. By determining these associations, the study aims to provide a foundation for interventions that enhance preservice science teachers' confidence and competence in utilizing AI within science education.

2.2 Research Locale

The study was conducted in prominent state higher education institutions within Tacloban City,

Philippines that are recognized for their commitment to excellence in teacher education and for producing competent, quality educators. These institutions serve as key centers for teacher preparation in the region, making them appropriate and relevant sites for the present study. Data collection employed a hybrid setup, combining face-to-face and online administration to ensure wider reach and accessibility among the respondents. Face-to-face participants accomplished the survey questionnaires inside classrooms, providing a familiar and comfortable environment, while online participants were reached through Google Forms. In both modes, the confidentiality and integrity of responses were strictly maintained throughout the entire data collection process.

2.3 Research Respondents

The respondents were preservice science teachers within the institutions. This study employed a total population sampling technique where 143 of the entire population meeting the criteria was included. Since the population size within the locale was relatively small and manageable, this technique best suited the study. This ensures that every member of the target group was given the opportunity to participate, thereby increasing the representativeness and validity of the findings. The respondents were selected if there were fourth-year preservice science teachers in the school year 2025-2026, enrolled in science education program, and had completed their teaching internship. However, respondents were excluded if they were from other disciplines and enrolled in private institutions.

2.4 Research Instruments

The study utilized two adapted and modified survey questionnaires as the primary data collection instruments: the AI Anxiety Scale by Wang and Wang (2022) and the Teacher's Level of Self-Efficacy with AI by Sumandal (2023). Both instruments employed a 5-point Likert scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Both underwent content validation by three experts, namely two guidance counselors and one science education expert, followed by pilot testing. The results demonstrated high internal consistency across all anxiety dimensions: Learning ($\alpha=0.93$), Job Replacement ($\alpha=0.91$), AI Configuration ($\alpha=0.89$), and Sociotechnical Blindness ($\alpha=0.84$). Similarly, the Teacher's Level of Self-Efficacy with AI scale yielded high internal consistency ($\alpha=0.92$). These findings indicate strong and consistent reliability across both instruments, supporting their suitability for primary data collection.

2.5 Data Gathering Procedure

Prior to data collection, the researcher secured approval from the university's ethics review committee and obtained formal written permission from the administration of the state universities. The researcher then coordinated with the program coordinator to identify respondents who met the inclusion criteria. Selected respondents were provided with an informed consent form explaining the study's purpose, procedures, voluntariness of participation, confidentiality measures, and their right to withdraw at any time without penalty. The validated survey questionnaires were subsequently distributed through a hybrid setup, either face-to-face or via Google Forms, with clear instructions provided and the researcher remaining available to address any concerns through the supplied contact details. Respondents were given approximately 15–20 minutes to complete the questionnaires. All data were kept strictly confidential throughout the data collection process. Data collection was completed within a three-week timeframe during the school year 2025–2026, after which the data were analysed and interpreted through appropriate statistical methods.

2.6 Analysis of Data

The study utilized both descriptive and inferential statistics for data analysis using MS Excel and jamovi. Descriptive statistics, including mean and standard deviation, were used to summarize the data. For inferential statistics, Spearman's rho correlation was employed as the appropriate non-parametric measure to

determine the significant relationship between preservice science teachers' level of self-efficacy and their dimensions of AI anxiety. The significance level was set at $p < 0.05$.

2.7 Ethical Consideration

This study adhered to ethical standards throughout the research process. Prior to data collection, ethical approval was secured from the university's ethics review committee, followed by permission from the administration of each institution. All respondents were provided with an informed consent form explaining the study's purpose, procedures, voluntary participation, confidentiality measures, their right to withdraw at any time without penalty, and the minimal risks and benefits associated with the study. All data were kept strictly confidential and anonymized, stored securely and accessible only to the researcher, in full compliance with the Data Privacy Act of 2012.

3. Results and Discussion

This section presents the analysis and interpretation of data gathered based on the research questions, covering the anxiety level across each dimension, the self-efficacy level, the correlation between self-efficacy and each dimension of anxiety, and a proposed intervention program based on the salient findings of the study.

3.1 Anxiety Level

This section presents the anxiety level of preservice science teachers in Artificial Intelligence (AI) integration across four dimensions: Learning, Job Replacement, Sociotechnical Blindness, and AI Configuration. Each dimension was analysed individually using the mean scores and standard deviation.

Table 1

Anxiety level of preservice science teachers in Artificial Intelligence integration

Dimension	Mean	SD	Level of Anxiety
1.1 Learning	2.73	1.16	Moderate
1.2 Job Replacement	3.47	1.23	High
1.3 Sociotechnical Blindness	3.88	1.12	High
1.4 AI Configuration	3.12	1.14	Moderate
Overall	3.30	1.16	Moderate

Legend: 1.00–1.79 (Very Low); 1.80–2.59 (Low); 2.60–3.39 (Moderate); 3.40–4.19 (High); 4.20–5.00 (Very High)

Table 1 presents the anxiety levels of preservice science teachers regarding artificial intelligence integration. The anxiety level yielded an overall mean score of 3.30, which falls within the moderate level. Meanwhile, the overall standard deviation of 1.16 indicates moderate variability in the respondents' anxiety levels regarding AI integration. Among the four dimensions, Sociotechnical Blindness yielded the highest mean score ($M=3.88$, $SD=1.12$), followed by Job Replacement ($M=3.47$, $SD=1.23$), both interpreted as high. Meanwhile, AI Configuration ($M=3.12$, $SD=1.14$) and Learning ($M=2.73$, $SD=1.16$) yielded moderate levels. The results indicate that the respondents hold mixed feelings about AI integration, recognizing both its potential and the uncertainties it brings to their future teaching roles. The findings of this study are consistent with those of Darancik et al. (2025), who reported an overall moderate level among German teacher candidates. Similarly, within the Philippine context Albino et al. (2025), observed varying yet overall moderate levels among college students, affirming that is a widespread reality in preservice teacher education. Although preservice teachers show curiosity and openness toward AI, concerns about its implications remain, highlighting the need for targeted interventions to reduce uncertainty (Dumagay, 2025).

The learning dimension recorded the lowest mean score among the four dimensions at 2.73 ($SD=1.16$), which is interpreted as moderate. This indicates that preservice science teachers experienced a relatively manageable level of anxiety in terms of learning AI in their academic and teaching preparation. The

relatively lower score in this dimension suggests that the respondents were generally open to learning about AI and did not find the idea of acquiring AI-related knowledge to be highly threatening. The present findings align with the study of Albino et al. (2025), who identified a moderate anxiety in learning dimension among college students. However, the findings diverge from those of Eyüp and Kayhan (2023), who found lower level of anxiety in learning dimension among preservice Turkish language teachers, likely due to familiarity and prior AI exposure during their education.

The job replacement dimension yielded a mean score of 3.47 (SD=1.23), interpreted as a high level of anxiety. This dimension reflects the fear among preservice science teachers that AI technologies may eventually replace their roles as educators. Among the four dimensions examined, job replacement emerged as one of the most prominent sources of anxiety, indicating that concerns about occupational displacement weigh heavily on respondents' perceptions of AI. This finding is consistent with those of Falebita (2024) and Eyüp and Kayhan (2023), both of whom reported high levels in the job replacement dimension, suggesting strong apprehension about employment security and the fear that AI will eventually displace human workers in the field. Locally, Albino et al. (2025) similarly reported high levels in this dimension among college students. These parallel findings suggest that AI-induced job replacement anxiety is a deeply felt and widely shared experience among educators.

Among all dimensions, sociotechnical blindness yielded the highest mean score of 3.88 (SD = 1.12), interpreted as a high level of anxiety. This dimension reflects anxiety arising from uncertainty about the broader societal, ethical, and human implications of AI technologies (Wang & Wang, 2022). The result suggests that respondents are particularly concerned not only with their personal use of AI but also with its wider societal impacts, including ethical risks and the potential consequences of its integration into academic settings. This finding is consistent with Solamillo (2025), who reported that sociotechnical blindness among educators recorded the highest mean, reflecting strong concerns about AI misuse, malfunction, and its capacity to operate beyond human control. Likewise, Albino et al. (2025), Devanadera (2025), and Maghanoy et al. (2025) reported high levels in the sociotechnical blindness dimension, identifying it as the dominant source of AI-related anxiety. However, the present finding diverges from that of Eyüp and Kayhan (2023), who reported a moderate level among preservice teachers, suggesting limited understanding and knowledge about AI.

The AI configuration dimension yielded a mean score of 3.12 (SD=1.14), interpreted as a moderate level of anxiety. This dimension reflects the discomfort and unease that preservice science teachers experience when confronted with the physical presence or human-like appearance of humanoid AI systems. The moderate mean score implies that while respondents experience some level of apprehension toward humanoid AI, these concerns are not overwhelming and remain manageable. This finding is consistent with Albino et al. (2025), Devanadera (2025), Eyüp and Kayhan (2023), and Solamillo (2025), all of whom reported moderate levels of anxiety in this dimension among educators, suggesting that discomfort extends beyond technology itself, encompassing deeper apprehensions about how AI reshapes professional identities and responsibilities, the perceived autonomy of humanoid systems, and concerns about its physical and configurational aspects. Furthermore, respondents may have formed their perceptions of humanoid AI largely through news, films, and social media portrayals, which often carry distorted narratives, particularly within the Philippine context where humanoid AI has not yet become widespread. This aligns with Li and Huang's (2020) Fear Acquisition Theory, which posits that fear may develop through observational learning and indirect exposure, such as media narratives.

3.2 Self-Efficacy Level in AI Integration

This section presents the self-efficacy level of preservice science teachers in artificial intelligence integration.

Table 2***Self-Efficacy Level of Preservice Science Teachers in AI Integration***

Statement	Mean	SD	Interpretation
I can craft good questions related to science for students with the help of AI.	4.15	0.94	High
I can provide a scientific alternative explanation or an example when students need clarification with the help of AI.	4.12	0.91	High
I can develop lesson plans that are fitted to the needs of each student using AI.	4.02	0.95	High
I can explain difficult science lessons in simple instructions with the help of AI.	4.15	0.93	High
I can use various assessment strategies with the help of AI.	4.04	0.93	High
I can present the lesson more engagingly through the help of AI.	4.02	0.98	High
I can instantly respond to students' difficult science questions with the help of AI.	3.98	0.96	High
I can create relevant scientific content, supplementary materials, and other resources beyond traditional textbooks with the help of AI.	4.04	0.97	High
I can accurately provide scientific knowledge to students through AI-generated information.	3.81	1.02	High
I can quickly provide feedback on students' output through the help of AI.	3.60	1.12	High
I can help students increase their memory of the lessons taught through AI.	3.57	1.09	High
I can keep students on task on difficult science assignments using AI.	3.67	1.06	High
I can maintain students' discipline with the aid of AI.	3.25	1.21	Moderate
I can assist parents in using AI for them to monitor their children's school tasks.	3.30	1.17	Moderate
I can help students think critically using AI.	3.47	1.26	High
Overall	3.81	1.03	High

Legend: 1.00–1.79 (Very Low); 1.80–2.59 (Low); 2.60–3.39 (Moderate); 3.40–4.19 (High); 4.20–5.00 (Very High)

Table 2 presents the self-efficacy levels of preservice science teachers in AI integration. Overall, the respondents demonstrated a high level of self-efficacy with a mean score of 3.81 (SD=1.03). The overall standard deviation indicates moderate variability in the respondents' self-efficacy in AI integration. The high overall mean suggests that the respondents generally expressed strong confidence in using AI as a tool in their instructional practices. This finding is consistent with Sumandal (2023), and Ahmed et al. (2025), who reported that teachers with higher self-efficacy were more confident in integrating AI into their instructional practices and demonstrated greater willingness to continuously use AI in teaching. Likewise, Suardewa et al. (2024) reported that preservice teachers who possessed greater confidence in using AI were more likely to intend to integrate AI into their teaching practices. Despite the overall high level of self-efficacy, two areas showed moderate confidence: classroom management (M=3.25) and parental engagement (M=3.30). This suggests that preservice science teachers may have limited exposure to AI specifically designed for these purposes. Bergdahl and Sjöberg (2025) noted that teachers' self-efficacy tends to differ depending on their prior exposure to AI and the perceived relevance of AI to specific roles, which may explain the comparatively lower self-efficacy observed in these areas.

3.3 Relationship Between Self-Efficacy Level and Dimensions of Anxiety Level in AI Integration

This section presents the results of the Spearman rho correlation analysis conducted to determine the relationship between the self-efficacy level and each dimension of anxiety in AI integration among preservice science teachers. Spearman rho was employed as the appropriate non-parametric measure of correlation. The null hypothesis states that there is no significant relationship between the level of each dimension of anxiety and self-efficacy in AI integration among preservice science teachers.

Table 3*Correlation Between Self-Efficacy Level and Dimensions of Anxiety Level in AI Integration*

Anxiety Dimension	Spearman's r_s	p -value	Relationship	Interpretation
Learning	-0.202*	0.015	Weak	Significant
Job Replacement	-0.074	0.377	Negligible	Non-significant
Sociotechnical Blindness	-0.058	0.491	Negligible	Non-significant
AI Configuration	-0.200*	0.017	Weak	Significant

Note: Correlation is significant at $p < 0.05$

Table 3 presents the correlation between self-efficacy level and dimensions of anxiety in AI integration among preservice science teachers. The Spearman rho correlation between self-efficacy level and Learning anxiety yielded $r_s = -0.202$ with a p -value of 0.015, which is below the 0.05 level of significance. This indicates a weak negative correlation that is statistically significant. Consequently, the null hypothesis is to be rejected, suggesting that there is a significant relationship between the self-efficacy level and the Learning dimension of anxiety level in AI integration among preservice science teachers.

This result is consistent with the findings of Albino et al. (2025), who reported a significant relationship between AI self-efficacy and AI anxiety specifically learning dimension among college students implying that higher confidence in AI is associated with reduced learning-related concerns. Similarly, Ayduğ and Altınpulluk (2025) emphasized that preservice teachers with stronger technological digital literacy skills tend to exhibit lower levels of AI anxiety reinforcing the notion that perceived competence is closely associated with lower anxiety in AI-integrated learning environments.

The Spearman rho correlation between self-efficacy level and Job Replacement anxiety yielded $r_s = -0.074$ with a p -value of 0.377, which is above the 0.05 level of significance. This indicates a negligible correlation that is not statistically significant. Consequently, the null hypothesis failed to be rejected, suggesting that there is no significant relationship between the self-efficacy level and the Job Replacement dimension of anxiety in AI integration among preservice science teachers.

The non-significant result implies that despite the high level of job replacement anxiety observed among the respondents, it is not associated with the self-efficacy of preservice science teachers in using AI. Kaya et al. (2022) identified the fear of losing one's job to AI as one of the primary contributors to AI anxiety, noting that this concern is strongly associated with negative attitudes toward AI adoption in professional settings. This result diverges from Albino et al. (2025), who found a significant relationship with Job Replacement and self-efficacy. Given these mixed findings, targeted awareness programs are necessary to help preservice teachers navigate AI concerns effectively (Darancik et al., 2025). Consistent with Fear Acquisition Theory, these findings suggest that Job Replacement anxiety may be more closely linked to factors outside of self-efficacy, such as exposure to media narratives, explaining the absence of a significant correlation.

The Spearman rho correlation between self-efficacy level and Sociotechnical Blindness anxiety yielded $r_s = -0.058$ with a p -value of 0.491, which is above the 0.05 level of significance. This indicates a negligible correlation that is not statistically significant. Consequently, the null hypothesis failed to be rejected, suggesting that there is no significant relationship between the self-efficacy level and the Sociotechnical Blindness dimension of anxiety level in AI integration among preservice science teachers.

This finding differs from the results of Albino et al. (2025), who reported a low but significant relationship between Sociotechnical Blindness and AI self-efficacy. This contradiction may be attributed to differences in respondent discipline. Furthermore, Eden et al. (2024) noted that ethical concerns in AI integration, including issues of data privacy, algorithmic bias, and equity, remain pressing regardless of how confidently educators adopt AI tools, underscoring the need for explicit ethical literacy alongside technical training. Li and Huang (2020) further identified this dimension as part of a multidimensional structure of AI anxiety that encompasses not only personal capability concerns but also broader existential worries about AI's

role in society.

The Spearman rho correlation between self-efficacy level and AI Configuration anxiety yielded $r_s = -0.200$ with a p -value of 0.017, which is below the 0.05 level of significance. This indicates a weak negative correlation that is statistically significant. Consequently, the null hypothesis is rejected, suggesting that there is a significant relationship between the self-efficacy level and the AI Configuration dimension of anxiety in AI integration among preservice science teachers.

This finding is consistent with Varol (2025) who reported a weak negative correlation with AI configuration anxiety and self-efficacy suggesting to strengthened self-efficacy together with technical competence. Likewise, Albino et al. (2025) established a relationship between AI configuration and self-efficacy among college students.

3.4 Proposed Intervention Program on the Study's Findings

Based on the salient findings of the study, a five-phase intervention program entitled ARISE: AI Readiness and Integration Support for Educators is proposed to holistically address the anxiety of preservice science teachers while simultaneously strengthening their self-efficacy in AI integration. The program name reflects its core purpose of helping preservice science teachers rise above their fears and uncertainties toward becoming confident, ethically aware, and professionally resilient educators in an AI-integrated society. The program consists of five phases spread across a period of thirteen weeks. Each phase directly responds to a specific dimension of anxiety identified in the study. Phase 1 targets learning anxiety through AI orientation and hands-on skill building. Phase 2 addresses sociotechnical blindness anxiety by developing ethical and societal awareness of AI. Phase 3 responds to job replacement anxiety through career guidance and professional identity development. Phase 4 aims to address AI configuration anxiety through gradual and guided exposure to AI systems. Phase 5 consolidates all learning through integrated teaching practice and reflective evaluation. Together, these phases form a comprehensive, evidence-based response to the multidimensional nature of anxiety as identified in the study while strengthening and sustaining self-efficacy, supported by literature showing that structured AI professional development programs significantly improve pedagogical skills and technological self-efficacy among preservice teachers (Khalid et al., 2026; Meegan & Young, 2025).

4. Conclusion

Preservice science teachers demonstrated a moderate overall level of anxiety and a high level of self-efficacy in AI integration, reflecting a complex interplay of confidence and apprehension in navigating the demands of AI-integrated educational environments. Self-efficacy was differentially associated with the dimensions of anxiety, showing significant relationships only with Learning and AI Configuration anxiety, the dimensions most closely tied to individual familiarity and exposure to AI, while remaining unrelated to Job Replacement and Sociotechnical Blindness. This suggests that self-efficacy is not uniformly associated with all dimensions of anxiety, as fears related to occupational displacement and the broader societal consequences of AI may be associated with factors beyond self-efficacy alone, consistent with Fear Acquisition Theory. These findings highlight that addressing anxiety among preservice science teachers requires a comprehensive approach that builds technical confidence, cultivates ethical awareness, and strengthens professional identity. Grounded in Bandura's Self-Efficacy Theory and Fear Acquisition Theory, the proposed ARISE intervention program addresses this need through five targeted phases designed to transform uncertainty into informed readiness. As AI continues to reshape science education, preservice science teachers who are equipped not only with technical competence but also with ethical awareness and a strong sense of professional identity will be better prepared to navigate and contribute meaningfully to AI-integrated classrooms.

5. Recommendation

Preservice science teachers are encouraged to actively engage with AI tools beyond formal coursework and critically examine media narratives to reduce unfounded fears, particularly regarding Job Replacement and Sociotechnical Blindness. Teacher educators should embed AI exploration into existing courses and mentoring sessions, reframing AI as a professional tool rather than a threat to guide preservice teachers in their teaching practice. School administrators are urged to establish clear ethical AI policies, and provide targeted professional development on AI-assisted classroom practices. Policymakers should develop supportive frameworks that guide AI integration in teacher education while funding initiatives that adequately equip teacher educators. Finally, future researchers are encouraged to replicate this study across broader contexts using mixed methods approaches, explore additional variables such as prior AI exposure and institutional AI culture, and conduct empirical evaluations of the proposed intervention program to confirm its effectiveness in reducing anxiety and building self-efficacy among preservice science teachers.

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