



Associated conference: Shaping the Future of Education in the age of AI: Empowering inclusion, innovation and ethical growth

Conference location: Bologna, Italy

Conference date: 15–17 June, 2025

How to cite: Kaban, A. L., Ozmutlu, M., Orhan, S. F., Ozer, L., Aydogmus, T., Kolat, F. N. 2025. From AI Anxiety to AI Empowerment: Transforming Teacher Education with Generative AI. *Ubiquity Proceedings*, 6(1): 49. DOI: <https://doi.org/10.5334/uproc.217>

Published on: 03 September 2025

Copyright: © 2025 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>.

UBIQUITY PROCEEDINGS



<https://ubiquityproceedings.com>

From AI Anxiety to AI Empowerment: Transforming Teacher Education with Generative AI

Aysegul Liman Kaban¹, Meltem Ozmutlu², Sefika Feza Orhan³, Lara Ozer⁴, Taha Aydogmus⁵, Fatma Nazire Kolat⁶

¹ STEM Education Department, Mary Immaculate College, University of Limerick, Ireland; aysegul.limankaban@mic.ul.ie

² Computer Education and Instructional Technologies Department, Bahcesehir University, Türkiye

³ Computer Education and Instructional Technologies Department, Bahcesehir University, Türkiye

⁴ Computer Education and Instructional Technologies Department, Bahcesehir University, Türkiye

⁵ Computer Education and Instructional Technologies Department, Bahcesehir University, Türkiye

⁶ Computer Education and Instructional Technologies Department, Bahcesehir University, Türkiye

Correspondence: Aysegul Liman Kaban: aysegul.limankaban@mic.ul.ie

Abstract:

The accelerated integration of generative artificial intelligence (GenAI) into educational settings has underscored a significant preparedness gap among teachers, particularly in terms of digital competence, ethical literacy, and emotional readiness. This study examines the impact of a structured, two-day professional development (PD) program on public school teachers in Türkiye, aimed at mitigating AI-related anxiety and enhancing instructional integration of GenAI tools. Grounded in Roblyer's Technology Integration Planning Model (TIPM), the program introduced participants to educational AI applications such as Lessonplans.ai, MagicSchool.ai, CanvaAI, and Gradescope through interactive workshops and reflective sessions. Quantitative analyses using the Artificial Intelligence Anxiety Scale and Wilcoxon Signed-Rank Test revealed statistically significant reductions in learning anxiety and job replacement anxiety following the intervention. However, no significant changes were observed in sociotechnical blindness or AI configuration anxiety. While participants reported high satisfaction with the training, these findings suggest that short-term PD initiatives, though effective in addressing operational concerns, are insufficient for fostering critical, ethical, and sustainable AI integration. The study concludes that meaningful teacher empowerment in the AI era requires longitudinal, ethically grounded, and psychologically supportive professional development models that go beyond technical proficiency to cultivate reflective and resilient educational practice.

Keywords: Generative AI in Education, Teacher Professional Development, AI Anxiety and Literacy, AI-Enhanced Instructional Design, Technology Integration in Teaching, Ethical AI in Education.

Introduction

The integration of Generative Artificial Intelligence (GenAI) in education is revolutionizing pedagogical practices, offering teachers new avenues to enhance lesson planning, instructional design, assessment, and student engagement. However, the rapid advancement of AI tools has introduced a dual challenge: while AI presents unparalleled opportunities for improving teaching efficiency and personalization, it also generates uncertainty, skepticism, and ethical concerns among educators. Many teachers experience AI anxiety, stemming from a lack of structured professional development programs that foster AI literacy, ethical awareness, and pedagogical integration strategies.

This study seeks to bridge this gap by investigating how structured teacher professional development (TPD) programs can facilitate the meaningful adoption of AI in education. Grounded in Roblyer's Technology Integration Planning Model (TIPM) and teacher education frameworks, the research explores the

implementation of AI-driven tools such as Lessonplans.ai, MagicSchool.ai, CanvaAI, and Gradescope in real-world classroom settings.

Through a two-day AI-enhanced professional development program, teachers engaged in hands-on activities that introduced them to AI-assisted lesson planning, instructional material creation, personalized learning design, and formative assessment methods. The training followed a pedagogically sound, ethics-driven approach, ensuring that AI was framed as a teacher-supporting tool rather than a replacement for educator agency. This study examines the pre- and post-training impact on teachers' AI confidence, and instructional practices, providing empirical insights into how AI literacy can be sustainably developed among educators.

In this context, answers to the following questions were sought in the study.

1. Is there a statistically significant difference in teachers' anxiety regarding the use of generative AI (GAI) tools in the classroom before and after the teacher training?
2. What is the level of teachers' satisfaction with the training they attended, and does it vary according to different demographic or contextual variables?

Methodology

This study employs a quantitative research design, integrating quantitative approaches to examine the impact of structured professional development on teachers' adoption of Generative AI (GenAI) in instructional design, assessment, and pedagogical practices. The research was conducted as part of a two full day AI-enhanced teacher training program, designed to systematically introduce AI tools while addressing teacher perceptions, confidence, and ethical considerations in AI integration.

Participants and Sampling

The study targeted primary and secondary school teachers working in public schools in Istanbul, Türkiye. A purposive sampling strategy was employed to select participants who met specific inclusion criteria: (1) being a state school teacher, (2) having an intermediate level of digital literacy, (3) having no prior structured training in AI-assisted teaching, and (4) demonstrating willingness to participate in AI-focused professional development. A total of 40 teachers participated in the training, divided into two cohorts. A total of 40 participants completed the post-test survey. The sample consisted of 32 female participants (80%), with 8 male participants representing a smaller proportion (20%). The most common age group was 38–43 years, accounting for 12 participants. In terms of professional background, the largest group comprised classroom teachers ($n = 15$), followed by English teachers ($n = 11$). Mathematics and science teachers (including physics, chemistry, and biology) each represented five participants, while smaller groups included social studies/history ($n = 2$), Turkish/literature ($n = 1$), and fine arts/physical education teachers ($n = 1$). The participants were generally experienced educators, with the most frequent range of professional experience being 12–15 years ($n = 9$). This demographic profile reflects a relatively homogeneous group of mid-career teachers, primarily from primary education and English language instruction backgrounds.

Study Design and Intervention

Participants engaged in interactive workshops, hands-on exercises, and collaborative lesson design tasks, applying AI tools to their specific subject areas. The training also incorporated peer discussions and expert-led reflections to facilitate critical thinking about AI's limitations, ethical use, and long-term sustainability in education. The training program was a two-day structured professional development (PD) intervention designed for public school teachers in Türkiye, aiming to reduce AI-related anxiety and build competence in using generative AI tools for teaching. The design followed Roblyer's Technology Integration Planning Model (TIPM) to ensure pedagogical coherence. During the AI-enhanced professional development program, our goals were to influence teachers' lack of AI knowledge and artificial intelligence (AI) anxiety.

For this purpose, the flow of the two-day training, which lasted 6 hours a day, was as follows.

Day 1: Foundational Concepts & Lesson Planning

- **Morning Session:**
Introduction to Artificial Intelligence in Education.
Ethical considerations: bias, data privacy, and the role of human oversight.
Exploring AI's role in personalized learning environments.
- **Afternoon Session:**
Hands-on training with **Lessonplans.ai** and **MagicSchool.ai**.
Teachers created AI-supported lesson plans aligned with their subject areas.
Focus on AI-human collaboration in curriculum design.

Day 2: Instructional Materials, Assessment, and Feedback

- **Morning Session:**
Interactive use of **CanvaAI** for visual instructional materials.
Automated and formative assessment strategies using **Gradescope**.
- **Afternoon Session:**
Use of **Quizgecko** and AI-powered rubrics for grading and feedback.
Designing AI-enhanced assessment scenarios.
Group work and reflection on pedagogical integration of AI tools.

Data Collection Instruments

The scale used in this study is the Artificial Intelligence Anxiety Scale, originally developed by; Wang & Wang (2019) ,and adapted into Turkish by Terzi (2020). The adaptation study confirmed the scale's reliability and validity in measuring AI-related anxiety levels. The high Cronbach's Alpha values in this study align with Terzi's findings, supporting the scale's robustness across different participant groups. The Cronbach's Alpha coefficients for the pre-test and post-test are 0.939 and 0.968, respectively. These values indicate a high level of internal consistency, demonstrating that the scale is highly reliable for measuring the intended construct of AI-related anxiety. The strong reliability of the scale supports the validity of the findings and confirms that the measurement instrument consistently captures the participants' responses.

Findings

Descriptive analyses were conducted to summarize satisfaction and anxiety scores across participants (N = 19). Participants reported high levels of satisfaction (M = 4.18, SD = 0.22) and low to moderate levels of anxiety (M = 2.03, SD = 0.55) on a 5-point Likert scale. Mean satisfaction and anxiety scores across different school types are shown in Table 2.

Table 2 : Mean Satisfaction and Anxiety Scores by School Type

School Type	Satisfaction Mean ($\pm$ SD)	Anxiety Mean ($\pm$ SD)
Primary	4.22 ($\pm$ 0.17)	2.23 ($\pm$ 0.42)
Middle	4.12 ($\pm$ 0.25)	1.67 ($\pm$ 0.28)
High	4.21 ($\pm$ 0.27)	2.14 ($\pm$ 0.44)

Participants from primary schools exhibited slightly higher anxiety scores compared to those from middle schools; however, satisfaction scores remained consistently high across all groups. Given the small sample size and potential violations of normality assumptions, non-parametric tests were utilized. A Kruskal-Wallis H test indicated that there were no statistically significant differences in satisfaction scores between school types, $H(2) = 0.76$, $p = .68$. Similarly, no significant differences were found in anxiety scores across school types, $H(2) = 4.10$, $p = .13$. Although the p-value for anxiety approached significance, it remained above the conventional threshold of .05. Spearman's rank-order correlations were used to examine the relationships between teaching experience and satisfaction/anxiety scores.

Table 3: Spearman Correlation Results (Experience and Scores)

Variables Compared	Spearman's ρ	P value
Experience vs Satisfaction	+0.06	0.82
Experience vs Anxiety	-0.38	0.11

There was no significant correlation between experience and satisfaction ($\rho = .06$, $p = .82$). A moderate negative correlation was observed between experience and anxiety ($\rho = -.38$, $p = .11$), suggesting that more experienced teachers tended to report lower anxiety levels. However, this association did not reach statistical significance. Overall, findings indicate that teachers were highly satisfied with the training, and reported relatively low levels of anxiety regarding AI integration. Neither school type nor teaching experience showed statistically significant effects on satisfaction or anxiety levels. While there was a non-significant trend suggesting that more experienced teachers might feel less anxious, further research with larger samples is required to validate these findings.

In order to analyse the main question of the study, 'Is there a significant difference between teachers' anxiety about the use of GAI tools in the classroom before and after AI-enhanced professional development program?', Wilcoxon Signed-Rank Test (because the data were not normally distributed) was performed for statistically significant difference analysis between the pre-test given 10 days before the training program and the post-test given after the training and presented in Table 2.

Table 4: Wilcoxon Signed-Rank Test (non-parametric) analyses:

Dimension	Participants	Wilcoxon Statistic	p-value	Pre-test Mean	Post-test Mean
Learning Anxiety	27	33.0	0.000047	2.87	1.57
Job Replacement Anxiety	27	20.5	0.000082	2.91	1.48
Sociotechnical Blindness	27	127.0	0.217	3.02	2.71
AI Configuration Anxiety	27	131.5	0.843	2.41	2.36

Table 4 presents the Wilcoxon Signed-Rank Test results comparing pre- and post-training anxiety scores across the four dimensions. Learning Anxiety and Job Replacement Anxiety show statistically significant decreases after the training program ($p < 0.001$), meaning participants felt less anxious about learning AI and less worried about AI replacing their jobs. Sociotechnical Blindness and AI Configuration Anxiety show no significant change ($p > 0.05$), indicating the training did not affect participants' deeper understanding of AI's societal impacts or their confidence in configuring or using AI properly.

Discussion

The findings of this study reveal that structured AI training significantly reduced teachers' learning anxiety and job replacement anxiety, while failing to make meaningful improvements in sociotechnical blindness and AI configuration anxiety. These results align with prior research indicating that while hands-on training

interventions are effective for operational skills development, they often fall short when addressing deeper socio-ethical dimensions of AI adoption.

Terzi (2020) emphasized that AI anxiety is multidimensional, rooted not just in fears about learning or job security, but also in sociotechnical blindness—the inability to grasp AI's broader societal impacts. The present study's insignificant change in sociotechnical blindness anxiety reflects exactly this complexity. Similar to Terzi's findings, the intervention appeared more successful in alleviating immediate personal concerns, but inadequate in promoting critical socio-technical awareness among teachers. Liu and Liu (2025) developed a five-dimensional AI anxiety scale for Chinese EFL teachers, emphasizing that job displacement fears and technological proficiency concerns are the most dominant sources of anxiety. In parallel, our study demonstrated a clear reduction in job replacement anxiety. However, just like Liu and Liu pointed out, dealing with teachers' AI anxiety requires a broader approach beyond technical training. Emotional aspects, such as fear of losing professional identity or the role of the teacher, remain unaddressed without ongoing psychological support and systematic institutional backing. Supporting this, Hopcan et al. (2024) also argue that while teachers are less concerned about learning AI itself, their anxiety spikes around employment insecurity and social displacement. Our study mirrors these patterns, confirming that short-term interventions can effectively teach AI tools but do little to dissolve deeper existential concerns. Furthermore, gender differences highlighted by Hopcan et al. and Zhang et al. (2023) suggest that female teachers may experience higher anxiety levels, particularly related to perceived ease of use and AI configuration. While our study did not explicitly analyze gender differences, the heavily female sample (80%) and the insignificant change in AI configuration anxiety suggest that this factor might have subtly influenced the outcomes. Moreover, Zhang et al. (2023) applied the Technology Acceptance Model (TAM) and found that AI anxiety negatively impacts perceived ease of use and perceived usefulness, thereby blocking technology adoption. Our findings similarly indicate that without addressing AI configuration anxiety, teachers' actual adoption rates may remain limited despite reductions in learning or job fears. In other words, getting teachers comfortable enough to experiment with AI is not the same as getting them critical and strategic about it. Satici et al. (2025) further argue that AI attitudes are deeply intertwined with mental health variables such as stress and well-being. Teachers with higher baseline anxiety tend to maintain more resistant or skeptical attitudes toward AI. The lack of change in sociotechnical blindness in our results suggests that interventions need to consider participants' broader emotional and psychological profiles, not just their technical skills. Simply put, AI literacy must be taught together with emotional literacy if long-term change is expected. The need for critical engagement is particularly crucial when considering the societal risks outlined by Satici et al. (2025)—such as algorithmic bias, privacy violations, and discrimination—that teachers will inevitably encounter in AI-integrated classrooms. Training programs that avoid discussing these issues create a false sense of competence, leaving teachers ill-prepared for real-world ethical challenges.

The findings of the present study are strongly supported by recent international frameworks and scholarly critiques emphasizing the urgent need for a more holistic approach to AI training in education. UNESCO's AI Competency Framework for Teachers (2024) explicitly outlines that technical skills acquisition, while important, is only one dimension of AI preparedness. The framework advocates for a balanced development across five key domains: human-centered mindset, ethics of AI, AI foundations and applications, AI pedagogy, and AI for professional learning. Without sustained attention to ethics and socio-technical implications, training risks producing teachers who can operate AI tools but lack the critical understanding necessary to engage responsibly with their broader societal impacts. This concern is echoed by Cukurova (2025), who critiques the dominant view of AI as mere technological tools and calls for a paradigm shift towards hybrid intelligence—a model that extends rather than diminishes human agency and critical thinking. The insignificant reduction in sociotechnical blindness found in this study reflects precisely the gap that Cukurova warns against: training interventions that address only immediate, operational anxieties while neglecting the deeper cognitive and ethical dimensions of AI integration. Furthermore, Bulathwela et al. (2024) argue that the prevailing techno-solutionist narrative in AI and education risks exacerbating educational inequalities rather than resolving them. They stress that inclusive and sustainable AI education must be participatory, critically reflective, and attuned to ethical concerns—principles largely absent from short-term technical training programs.

Finally, Giannakos et al. (2024) similarly caution against the hasty and uncritical adoption of generative AI in education. They emphasize the necessity for human-centric, ethically sound, and pedagogically robust frameworks to guide AI integration, highlighting that efficacy alone is insufficient if broader ethical and societal impacts are ignored. Taken together, the findings of this study reinforce a growing consensus: professional development that focuses narrowly on technical proficiency without embedding critical socio-technical literacy and emotional resilience will ultimately fail to prepare teachers for the complexities of AI-

mediated education. As UNESCO (2024) and leading scholars argue, fostering critical, ethical, and emotionally intelligent engagement with AI is not optional—it is fundamental to safeguarding the future of education. To sum up, the results confirm the concern raised by Satici et al. (2025) and Liu and Liu (2025) that short workshops, no matter how well-designed, are not enough. Effective interventions must be longitudinal, interdisciplinary, and critically reflective, combining technical skills, ethical awareness, and emotional resilience training. The literature converges on one critical point that our findings now reinforce: AI training that treats teachers as mere "users" rather than as critical co-designers of technology is fundamentally inadequate. Without sustained, reflective, and ethically grounded training models, educational AI risks becoming yet another top-down innovation that teachers superficially adopt but internally resist. In conclusion, the significant reduction in learning and job replacement anxieties is a hollow victory if teachers remain ethically blind and insecure about AI's configuration and societal role. What our findings show—starkly—is that if AI professional development continues to prioritize tool operation over critical literacy, it will fail both teachers and the students they serve.

Conclusion

The findings across these studies deliver a clear message: while artificial intelligence holds transformative potential for education, the teaching profession is critically underprepared to navigate its challenges. Despite UNESCO's global push for AI competency frameworks, the actual systemic support for teachers remains alarmingly sparse, leaving individuals to manage complex transitions largely on their own. Targeted professional development interventions have demonstrated real potential to reduce AI anxiety and build confidence. However, these interventions are short-term solutions to what is fundamentally a long-term, structural challenge. If AI is to be meaningfully and ethically integrated into education, policymakers, teacher educators, and institutional leaders must move beyond aspirational frameworks and invest in sustained, psychologically-informed, and equity-focused support structures. Otherwise, the risks will not only undermine AI adoption efforts but also deepen existing fractures in the teaching profession.

Competing interests

The authors have no competing interests to declare.

Funding Information (optional)

This research (Project No: 123B828) is funded by the TUBITAK 4005 Innovative Educational Practices Support Programme under the project titled "Innovative Technology Education for Branch Teachers Based on the Technology Integration Planning Model."

References

- Bulathwela, S., Pérez-Ortiz, M., Holloway, C., Cukurova, M., & Shawe-Taylor, J. (2024). Artificial intelligence alone will not democratise education: On educational inequality, techno-solutionism and inclusive tools. *Sustainability*, 16(2), 781. <https://doi.org/10.3390/su16020781>
- Cukurova, M. (2025). The interplay of learning, analytics and artificial intelligence in education: A vision for hybrid intelligence. *British Journal of Educational Technology*, 56(2), 469–488. <https://doi.org/10.1111/bjet.13514>
- Çakıroğlu, Ü. (2021). Teachers' AI literacy: Overcoming anxiety and embracing digital pedagogies. *Journal of Educational Technology & Society*, 24(3), 77-92.
- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.
- Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181-199.
- Giannakos, M., Azevedo, R., Brusilovsky, P., Cukurova, M., Dimitriadis, Y., Hernandez-Leo, D., Järvelä, S., Mavrikis, M., & Rienties, B. (2024). The promise and challenges of generative AI in education. *Behaviour & Information Technology*. <https://doi.org/10.1080/0144929X.2024.2394886>

- Holmes, W., Bialik, M., & Fadel, C. (2022). AI and education: A critical review. OECD AI & Society.
- Hopcan, S., Türkmen, G., & Polat, E. (2024). Exploring the artificial intelligence anxiety and machine learning attitudes of teacher candidates. *Education and Information Technologies*, 29, 7281–7301. <https://doi.org/10.1007/s10639-023-12086-9>
- Kaplan-Rakowski, R., Yang, M., & Chien, S. Y. (2023). Teachers' attitudes toward AI-driven educational technologies: Opportunities and challenges. *Educational Technology Research and Development*, 71(1), 35-57.
- Liu, X., & Liu, Y. (2025). Developing and validating a scale of artificial intelligence anxiety among Chinese EFL teachers. *European Journal of Education*, 60(e12902). <https://doi.org/10.1111/ejed.12902>
- Luckin, R. (2017). Towards AI-powered education: Intelligence unleashed. Pearson Research Report.
- Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence unleashed: An argument for AI in education. Pearson Research Report.
- Roblyer, M. D., & Doering, A. H. (2013). Integrating educational technology into teaching (6th ed.). Pearson Education.
- Satici, S. A., Okur, S., Yilmaz, F. B., & Grassini, S. (2025). Psychometric properties and Turkish adaptation of the artificial intelligence attitude scale (AIAS-4): Evidence for construct validity. *BMC Psychology*, 13(297). <https://doi.org/10.1186/s40359-025-02505-6>
- Selwyn, N. (2022). Should robots replace teachers? AI and the future of education. Polity Press.
- Teo, T. (2011). Factors influencing teachers' intention to use technology: A model of AI adoption. *Journal of Educational Computing Research*, 45(4), 439-464.
- Terzi, R. (2020). An adaptation of artificial intelligence anxiety scale into Turkish: Reliability and validity study. *International Online Journal of Education and Teaching (IOJET)*, 7(4). 1501-1515. <http://iojet.org/index.php/IOJET/article/view/1031>
- UNESCO. (2024). AI competency framework for teachers. United Nations Educational, Scientific and Cultural Organization. <https://doi.org/10.54675/ZJTE2084>
- Wang, Y. Y., & Wang, Y. S. (2019). Development and validation of an artificial intelligence anxiety scale: An initial application in predicting motivated learning behavior. *Interactive Learning Environments*, 1-16.
- Zhang, C., Schießl, J., Plöchl, L., Hofmann, F., & Gläser-Zikuda, M. (2023). Acceptance of artificial intelligence among pre-service teachers: A multigroup analysis. *International Journal of Educational Technology in Higher Education*, 20(49).