



Generative AI in Educator Preparation and Professional Development: An Updated Strategic Analysis of the Current Landscape, Evidence Base, Research Gaps, and Collaborative Opportunities

Report commissioned for: A4A and the University of Denver Morgridge College of Education
Updated publication date: February 2026

Executive Summary

Generative artificial intelligence (GenAI), particularly large language models (LLMs) that generate text, code, and other media from prompts, has moved from a novel classroom disruption to a persistent feature of the educator workforce and the K–12 policy environment. Since mid-2025, the field has continued to shift from “Should we ban this?” toward “How do we govern it, teach with it, and teach about it?” That shift has intensified the urgency for educator preparation programs (EPPs) and professional development (PD) systems to build coherent capacity, not just tool familiarity.

This updated report synthesizes recent peer-reviewed research, policy guidance, and sector reports to describe the current state of GenAI in educator preparation and in-service professional learning, with special attention to a still-underdeveloped frontier: using GenAI to develop the interpersonal leadership skills required to manage complex student interactions (e.g., de-escalation, restorative conversations, family communication, coaching/mentoring, and culturally responsive conflict resolution).

- Educator preparation remains in an early, uneven adoption stage. In a national CRPE survey of education school leaders (over 500 contacted), 59% reported providing some AI-related instruction to preservice teachers, but it was most often embedded in existing coursework and frequently oriented toward plagiarism prevention; only about 25% reported training future teachers on ways AI can support new approaches to teaching (Weiner, Lake, & Rosner, 2024). Faculty confidence and buy-in remain a primary bottleneck (Weiner et al., 2024).
- The in-service PD landscape is expanding rapidly, but it is fragmented by provider type, cost, and evidence quality. National data suggest that district-provided AI training is increasing: RAND’s American School District Panel found that 48% of districts reported training teachers on GenAI by fall 2024 (up from 23% in fall 2023), with an additional 26% planning training during the 2024–2025 school year (RAND Corporation, 2025).

- Empirical studies are emerging, but most evaluations remain short-term and small-scale. For example, a randomized controlled trial in teacher education found that adaptive feedback generated by ChatGPT improved preservice teachers' performance on a diagnostic reasoning task compared with static expert feedback (Kinder et al., 2025). Such results are promising but do not yet constitute an implementation-ready evidence base for broad adoption.
- Standards and governance guidance have matured. UNESCO's AI Competency Framework for Teachers (UNESCO, 2024) and the U.S. Department of Education's AI integration toolkit for education leaders (U.S. Department of Education, Office of Educational Technology, 2024) provide actionable competency and governance roadmaps. These documents emphasize human-centered use, equity, privacy, transparency, and accountability.
- The most consequential gap remains practice-based leadership learning for high-stakes interactions. Existing AI in schools is heavily concentrated in productivity tools and in monitoring/analytics for safety and behavior. Far fewer initiatives use GenAI to create "practice spaces" (simulated conversations and scenarios) where educators can rehearse and receive feedback on difficult interactions. This is a high-leverage opportunity for research-practice partnerships, including the design, piloting, and rigorous evaluation of GenAI-enabled simulations aligned to educator preparation and leadership standards.

Across the report, we propose a set of strategic collaboration opportunities, focused on practice-based simulation, faculty and mentor development, and longitudinal research, designed to strengthen educator preparation and leader learning while safeguarding privacy, civil rights, and equity.

The Current State of Generative AI in Educator Preparation Programs

The public release of GenAI systems has accelerated expectations for what new teachers should know about digital tools, assessment integrity, data privacy, and instructional design. At the same time, GenAI introduces new skill demands that are not well covered by traditional "educational technology" coursework: evaluating probabilistic outputs, working with model limitations and hallucinations, protecting sensitive data, and designing learning tasks that preserve human thinking and agency (UNESCO, 2023; U.S. Department of Education, Office of Educational Technology, 2024). The central challenge for educator preparation is not merely "adding AI" to a syllabus. It is building coherent professional judgment about when GenAI is appropriate, how to use it without eroding learning, and how to lead students ethically in an AI-rich information environment. This requires EPPs to integrate AI-related competencies across content

methods, assessment, classroom management, and clinical practice, not only in a standalone module.

Adoption and Integration

Sector-wide evidence continues to indicate that most EPPs are in an early adoption phase, with substantial variation by institution and by faculty interest. A key national snapshot comes from the Center on Reinventing Public Education (CRPE). In its October 2024 report, CRPE surveyed education school leaders to understand how preservice teachers and faculty are engaging with AI. While 59% of respondents reported providing some AI-related instruction to preservice teachers, the dominant emphasis was plagiarism prevention; only about one-quarter of programs reported training future teachers on practices that use AI to support new approaches to teaching (Weiner et al., 2024).

The same CRPE report found that many institutions lacked formal policies around AI tool use, and only about one-third had formed partnerships or brought in technical experts to support faculty or student learning around AI (Weiner et al., 2024). This pattern suggests that EPPs are often responding defensively (academic integrity and policy compliance) rather than proactively (curricular innovation and teaching practice). Peer-reviewed scholarship in teacher education broadly aligns with this picture: the field is still articulating what “AI-ready teaching” should mean, and how to translate emerging possibilities into consistent program design (Panday-Shukla, 2025; Daher, 2025).

Faculty Capacity and the “Teacher Educator Bottleneck”

Across EPPs, faculty capacity remains the primary constraint on meaningful integration. CRPE’s survey found that only 10% of education school leaders reported that their faculty members were confident in using AI, and more than half indicated that faculty did not feel confident integrating AI tools and resources into instructional practices (Weiner et al., 2024). Leaders described a mix of indifference (“not a priority”), risk concerns (privacy and intellectual property), and identity threats (fear of replacement) (Weiner et al., 2024).

This bottleneck is significant because EPPs are practice-focused. Faculty must be able to model responsible use, design assignments that leverage GenAI without outsourcing thinking, and coach preservice teachers through the kinds of professional dilemmas that AI intensifies (e.g., whether and how to disclose AI use to students, how to verify AI-generated content, and how to respond to student AI misuse). When faculty confidence is low, programs tend to default to narrow “detection and deterrence” approaches that do not build the professional judgment needed in classrooms.

One implication for program design is that faculty development cannot be treated as optional or ad hoc. Competency frameworks designed for teachers can also be adapted for teacher educators. UNESCO's AI Competency Framework for Teachers emphasizes not only AI knowledge, but also ethics, pedagogical integration, and professional learning, areas that closely mirror teacher educator needs (UNESCO, 2024).

Emerging Models in Teacher Education Research

Although implementation at scale is uneven, the research base is beginning to include empirical studies that move beyond perceptions and into instructional design and learning outcomes. A notable example is Kinder et al.'s (2025) randomized controlled trial within teacher education, which compared adaptive LLM-generated feedback to static expert feedback in a diagnostic reasoning writing task. The LLM-feedback condition produced improvements in performance and was perceived as more useful and engaging by participants (Kinder et al., 2025). Other emerging studies examine how preservice teachers integrate GenAI into unit design and planning processes (Wen & Wen, 2024) and how GenAI can surface or strengthen pedagogical content knowledge in teacher preparation contexts (Blonder et al., 2024).

Together, these studies point to plausible "high-yield" applications for EPPs: (a) using GenAI to provide rapid formative feedback on preservice teachers' written reasoning, (b) supporting structured rehearsal of planning and reflection routines, (c) enabling differentiated practice opportunities when instructor time is limited, and (d) supporting preservice teachers' lesson/unit design processes when paired with explicit pedagogical guardrails (Wen & Wen, 2024). However, these applications also highlight a non-negotiable design requirement: preservice teachers must be taught to interrogate and verify AI feedback rather than accept it as authoritative.

At the same time, the teacher education field is still clarifying what "AI-ready teaching" should mean and how to prepare educators ethically and equitably. Perspective and conceptual work emphasizes that EPPs should embed AI literacy as a professional foundation, spanning technical understanding, pedagogical judgment, ethics, and equity (Daher, 2025; Panday-Shukla, 2025). Research also highlights that teacher educators themselves need targeted professional learning to build this capacity, including support for integrating GenAI into coursework and clinical mentoring (Nyaaba & Zhai, 2024; Weiner et al., 2024).

Measurement: From "Tool Use" to Competence and Self-Efficacy

As the field matures, researchers are developing measures for teachers' AI-related competence and confidence. Chiu, Ahmad, and Çoban (2025) developed and validated the Teacher Artificial Intelligence Competence Self-Efficacy (TAICS) scale, arguing that

educators need competence across practical use, assessment, and ethical considerations, not simply digital tool familiarity. Such measurement tools can support EPP self-studies by enabling programs to assess baseline readiness, identify growth over time, and connect training experiences to changes in self-efficacy and practice. For EPPs and preparation of school leaders, measurement work also supports a “tiered” approach to competencies: foundational AI literacy (how GenAI works and fails), pedagogical integration (designing tasks, feedback, differentiation), and leadership-level governance (policy, procurement, risk management, and stakeholder communication).

Clinical Practice and Mentoring

Clinical placements remain one of the least developed areas in the GenAI preparation literature, despite being the context where novices most need guided judgment. Preservice teachers are likely to encounter mentor teachers and school policies that vary widely in AI acceptance and permissible use. As a result, EPPs should anticipate “policy friction” between university guidance and district practice. The U.S. Department of Education’s AI toolkit urges leaders to ground AI decisions in privacy, civil rights, and equity considerations, suggesting that EPPs should treat clinical sites as governance partners rather than simply placement contexts (U.S. Department of Education, Office of Educational Technology, 2024).

A practical step for EPPs is to create shared, scenario-based guidance for mentors and residents (e.g., when using AI for lesson planning is appropriate, when entering student data is prohibited, how to discuss AI with families), and to align those scenarios to both program expectations and district policies. This creates a consistent “professional floor” even when local practices differ.

The Professional Development Landscape for In-Service Educators and Leaders

While educator preparation is adapting slowly, the professional development ecosystem for in-service educators has expanded rapidly since 2023. This growth is driven by two forces: (a) educators’ day-to-day exposure to GenAI as a productivity tool, and (b) leaders’ need to develop policy, procurement, and risk-management approaches for AI-enabled technologies (RAND Corporation, 2024; U.S. Department of Education, Office of Educational Technology, 2024).

At the same time, the PD market is fragmented. Educators can access learning through district workshops, union initiatives, university certificates, nonprofit programs, and vendor-provided modules. The challenge for the field is not a lack of offerings, but the uneven alignment of those offerings to evidence-based PD design, ethical governance, and the practical realities of school constraints (time, infrastructure, and tool access).

District-Led Training: Rapid Growth with Equity Concerns

National survey evidence suggests that district-led training on GenAI is increasing. RAND’s American School District Panel reported that 48% of districts indicated they had provided training to teachers about GenAI-powered tools by fall 2024, double the share reported in fall 2023 (23%). Another 26% of districts reported plans to provide such training during the 2024–2025 school year (RAND Corporation, 2025).

RAND also reports equity-relevant gaps in both training and tool use. In 2023–2024, one-quarter of ELA, math, and science teachers reported using AI tools for instructional planning or teaching, and nearly 60% of principals reported using AI tools for their work; teachers and principals in higher-poverty schools were less likely to report using AI tools (RAND Corporation, 2024). This pattern suggests that the early benefits of GenAI (time savings, access to planning support, rapid feedback) could accrue unevenly unless PD and tool access are intentionally designed for digital equity.

Union and Sector-Wide Initiatives

A notable development since the previous report is the emergence of large-scale, educator-led training initiatives. The American Federation of Teachers (AFT) announced the National Academy for AI Instruction, aimed at providing free training and practical support for educators at scale (American Federation of Teachers, 2025). This model is significant because it positions teachers as key stakeholders in shaping responsible use, rather than passive recipients of vendor tools.

In parallel, professional associations and nonprofits have expanded AI-related PD. ISTE (and ISTE+ASCD) have invested in educator learning experiences focused on responsible AI integration, policy development, and classroom practice (ISTE, n.d.; ISTE+ASCD, n.d.). Such initiatives can support a common language and shared “practice moves” across districts, especially when local capacity is limited.

University and Certificate Programs

University-based certificate programs continue to provide more intensive, cohort-based learning for educators positioned to lead AI implementation. Examples include specialized certificates housed within schools of education and continuing education units, often emphasizing strategy, ethics, and change leadership (University of California, Irvine School of Education, n.d.; University of San Diego Professional and Continuing Education, n.d.).

These programs may be well-suited for developing “AI integration leaders” (instructional coaches, principals, curriculum directors), but they also require time and tuition investments that can limit access. For systems focused on equity, university programs are most effective when paired with district- or union-level scholarship supports, aligned

credit pathways, and explicit plans for participants to lead capacity building in their home organizations.

Vendor and Platform-Based Microlearning

A large share of educator AI learning remains vendor-facilitated and self-directed (e.g., short modules on prompt writing, tool capabilities, and responsible use). Microsoft’s “AI for Educators” learning path is a widely accessible example of modular training designed for educators using AI-enabled productivity tools (Microsoft, n.d.). Microsoft also launched “Microsoft Elevate for Educators” in early 2026 as a broader support program that includes AI-focused resources for teaching and learning (Microsoft, 2026). These offerings can lower barriers to entry, but they can also overemphasize tool fluency relative to pedagogy, ethics, and governance. PD designers should treat vendor microlearning as one component within a broader learning arc that includes job-embedded practice, coaching, and structured reflection.

What We Know About Effective GenAI Professional Development

Despite fast growth in PD offerings, the empirical evidence base on effectiveness is still developing. Recent reviews highlight that intervention studies often involve small samples, short durations, and limited follow-up, making it difficult to draw conclusions about sustained practice change. Early experimental work suggests that GenAI-supported PD can influence educators’ higher-order thinking and self-efficacy under certain conditions (Lu et al., 2024). In an integrative literature review, Brandão, Pedro, and Zagalo (2024) found that effective GenAI-oriented PD commonly includes: (1) foundational AI literacy, (2) hands-on tool exploration, (3) explicit instruction on ethical frameworks, and (4) strategies for pedagogical integration.

These components align with long-standing findings about effective professional learning in general. Meta-analytic and design-oriented PD research emphasizes content focus, active learning, coherence with teachers’ contexts, sustained duration, and collective participation (Darling-Hammond, Hyler, & Gardner, 2017; Desimone, 2009). Applied to GenAI, this implies that one-off “AI awareness” workshops can be a useful entry point, but they are unlikely to change instructional practice without coaching, access to approved tools, and opportunities to rehearse and refine classroom routines. Teacher perception research suggests that current use is heavily skewed toward productivity (planning and administrative efficiency) rather than deeper instructional transformation. For example, Andersen and Yang’s (2025) survey of K–12 teachers found that educators most commonly used GenAI for instructional design and efficiency, with fewer applications explicitly aimed at fostering higher-order student

thinking. Their findings underscore the need for PD that connects GenAI use to learning goals, not just time savings.

Generative AI for Leadership in Managing Student Interactions

A defining feature of educational leadership is the ability to navigate complex, relational work: building trust, resolving conflict, communicating with families, supporting educators, and responding to student behavior in ways that are both effective and equitable. These skills are hard to develop through lectures alone; they require rehearsal, feedback, and reflection in situations that approximate real complexity. Most current AI adoption in schools does not directly target this relational learning problem. Instead, AI in practice is often concentrated in: (a) productivity supports (drafting communications, summarizing information), (b) analytics and monitoring tools that detect patterns or flag risks, and (c) instructional supports such as content generation or tutoring. In a comprehensive taxonomy of AI in educational leadership, Sposato (2025) notes that institutions often lack coherent evaluation and implementation frameworks, leading to fragmented adoption and missed opportunities for strategic, human-centered use.

This section argues that GenAI is uniquely positioned to support a different and underutilized application: practice-based simulations for developing adaptive leadership skills in high-stakes student interactions. This is a “missing middle” between policy documents and real-world crises, an area where safe rehearsal can prevent harm and build confidence.

From Monitoring to Practice Spaces

Monitoring and analytics tools can help leaders respond to incidents, but they do not teach leaders how to respond well. GenAI can help address this gap by generating interactive scenarios, role-play conversations, and multiple perspectives in a way that is difficult to scale with human actors alone.

- De-escalating a classroom conflict involving a student who is dysregulated or oppositional, while maintaining dignity and cultural responsiveness.
- Conducting a restorative conversation after harm has occurred (student-to-student conflict, bullying, or online misconduct), including preparation for follow-up supports.
- Responding to a family meeting where trust is low and emotions are high (e.g., discipline decisions, special education disputes, or equity-related concerns).
- Coaching a novice teacher after an incident, balancing accountability with psychological safety and growth-oriented feedback.
- Managing educator and student concerns about GenAI itself (academic integrity disputes, misinformation, or inappropriate AI-generated content).

GenAI-powered simulations do not replace authentic relationships or supervised practice. Instead, they can increase the frequency and variety of rehearsals, making it more feasible to practice rare but high-impact situations (e.g., crisis communication, discrimination incidents) without placing real students or families at risk.

Design Principles for Responsible Simulation

To be educationally useful and ethically defensible, GenAI simulations must be designed with clear boundaries and governance. The U.S. Department of Education's toolkit emphasizes privacy, civil rights, transparency, and human accountability, all of which are directly relevant to simulation design (U.S. Department of Education, Office of Educational Technology, 2024). UNESCO similarly emphasizes a human-centered approach and capacity development that protects agency and inclusion (UNESCO, 2023, 2024).

- **Human-in-the-loop feedback and assessment.** AI can generate scenarios and prompts, but evaluation of educator decisions, especially for high-stakes competencies, should be reviewed by qualified human assessors.
- **Data minimization and privacy-by-design.** Simulations should not require real student records or personally identifiable information; scenario libraries should be synthetic or de-identified, and tool procurement should include clear data retention and training-use terms (U.S. Department of Education, Office of Educational Technology, 2024).
- **Equity and bias testing.** Scenario outcomes and AI personas should be tested for differential treatment across race, disability, language background, and other identities, with explicit guardrails to prevent stereotyping and harmful language (UNESCO, 2023, 2024).
- **Alignment to standards and practice frameworks.** Simulations should map to existing leadership and teaching standards (e.g., instructional leadership, culturally responsive practice, trauma-informed approaches) so that practice is transferable to real settings.
- **Progressive complexity and scaffolding.** Novices should begin with structured scripts and prompts and gradually move toward open-ended interactions, enabling deliberate practice rather than "trial and error" in a high-risk space.

Evidence and Evaluation Considerations

The evidence base for GenAI simulations in educator leadership is still emerging. However, the teacher education trial by Kinder et al. (2025) illustrates that LLM-generated support can produce measurable gains on complex reasoning tasks when designed as structured feedback. A similar evaluation logic can be applied to

interaction simulations: define target competencies, use validated rubrics, collect artifacts (conversation transcripts and decision rationales), and measure both short-term skill gains and longer-term transfer to practice.

For high-stakes leadership skills, evaluation should go beyond satisfaction surveys. At minimum, it should assess (a) performance within scenarios (communication moves, equity-oriented decision making), (b) changes in self-efficacy and professional judgment (Chiu et al., 2025), and (c) transfer indicators during clinical residencies or early-career practice. Longitudinal designs and research-practice partnerships are therefore essential to avoid repeating patterns of edtech adoption that scale before evidence of benefit and safety is established.

Ethical Considerations and Policy Challenges

Ethical and policy issues are not side constraints; they are defining features of GenAI integration in education. Because GenAI systems can generate plausible but incorrect information, reflect societal biases, and rely on opaque training data, educator training must explicitly address professional responsibility, student rights, and institutional governance (UNESCO, 2023; U.S. Department of Education, Office of Educational Technology, 2024).

This section summarizes priority considerations for EPPs and in-service leaders, organized around governance, privacy, equity, and professional judgment.

Governance, Procurement, and Professional Judgment

Education systems are increasingly expected to make procurement and policy decisions about AI-enabled tools under conditions of uncertainty. The U.S. Department of Education's AI toolkit emphasizes that examples are not endorsements and recommends risk-aware decision processes that account for privacy, civil rights, and transparency (U.S. Department of Education, Office of Educational Technology, 2024). A common failure mode in early adoption is "shadow AI": educators using public tools without institutional vetting, unclear data policies, or coherent instructional expectations. Districts and EPPs can mitigate this by maintaining an approved-tool list, providing clear guidance on prohibited data entry (e.g., personally identifiable student information), and establishing decision rights about when AI can inform consequential decisions (assessment, placement, discipline). GenAI should augment, never replace, human professional judgment for consequential decisions.

Risk management frameworks developed outside education are increasingly relevant. The NIST Generative AI Profile builds on the AI Risk Management Framework and emphasizes mapping, measuring, managing, and governing risks, including reliability,

security, and harmful bias (National Institute of Standards and Technology, 2024). Education leaders can adapt these practices for procurement and program evaluation.

Data Privacy and Security

GenAI tools vary widely in how they store prompts, whether they use user data for model training, and what contractual protections exist. For educators, the practical implication is simple but critical: entering sensitive student information into a public AI system can create privacy and compliance risk. The U.S. Department of Education toolkit repeatedly emphasizes data minimization and transparency about how AI tools use data (U.S. Department of Education, Office of Educational Technology, 2024). EPPs and PD providers should treat privacy competence as a core professional skill, not a legal afterthought. This includes knowing what counts as sensitive information, understanding where AI systems log and store interactions, and using approved, privacy-aligned tools when AI is used for instructional planning or communication.

Bias, Equity, and Inclusion

Bias and inequity risks emerge in at least two ways. First, GenAI outputs can reproduce stereotypes or produce differential quality across language varieties and cultural contexts, potentially harming students from marginalized communities. Second, inequitable access to training and tools can amplify existing opportunity gaps for both educators and students (UNESCO, 2023, 2024; RAND Corporation, 2024).

UNESCO's competency framework positions ethics, inclusion, and human agency as foundational to teacher competence in AI contexts (UNESCO, 2024). For educator learning systems, this implies that PD must include: (a) bias awareness and mitigation strategies, (b) culturally responsive evaluation of AI-generated materials, and (c) explicit attention to which schools and communities have access to high-quality AI-enabled supports.

Academic Integrity and Assessment Redesign

GenAI intensifies assessment integrity challenges because it can generate human-like written responses and code. Many early institutional responses have focused on detection and deterrence. However, the CRPE report notes that plagiarism detection is the most common AI-related focus in teacher preparation, even though detection tools have been inconsistent (Weiner et al., 2024).

A more durable approach is assessment redesign: emphasizing process artifacts, oral defenses, in-class performance, and authentic tasks that require local knowledge, reflection, and professional judgment. For educator preparation, this is also a learning opportunity: preservice teachers should experience assessment approaches that

remain meaningful in AI-rich environments, so they can apply similar principles in their future classrooms.

Key Research Gaps and Priority Questions

The literature base on GenAI in educator preparation and PD is expanding, but several gaps remain persistent across sector reports, peer-reviewed studies, and policy guidance. Addressing these gaps is essential for building an evidence-informed approach rather than repeating cycles of technology adoption that outpace evaluation (U.S. Department of Education, Office of Educational Technology, 2024; Weiner et al., 2024).

- **Embedding GenAI in EPP curricula at scale.**Beyond early adopters, how can programs integrate AI literacy and pedagogical judgment across methods courses and clinical practice without overloading curricula?
- **Faculty development models.**What training designs most effectively increase teacher educators' confidence and competence, and how can these be sustained over time (Weiner et al., 2024; UNESCO, 2024)?
- **Longitudinal outcomes.**Do short-term gains (e.g., in self-efficacy or performance on practice tasks) translate into sustained instructional change and improved student outcomes?
- **Equity effects.**How do GenAI tools and PD programs differentially benefit or disadvantage educators and students across contexts (e.g., high-poverty vs. low-poverty schools), and which policy levers reduce these gaps (RAND Corporation, 2024, 2025)?
- **Leadership and interaction skills.**What is the impact of GenAI-enabled simulation on adaptive leadership skills (de-escalation, restorative conversations, coaching), and what safeguards are required to prevent bias and harm (UNESCO, 2023, 2024)?
- **Measurement and competency progression.**Which competency frameworks and validated measures (e.g., TAICS) can be used to track educator growth from foundational AI literacy to advanced governance and leadership competencies (Chiu et al., 2025)?
- **Governance and risk management in education contexts.**How do districts and preparation programs operationalize risk management (privacy, security, civil rights), and what procurement and policy models are most effective (National Institute of Standards and Technology, 2024; U.S. Department of Education, Office of Educational Technology, 2024)?

Strategic Collaborative Opportunities

The current landscape presents an opportunity for intentional, evidence-generating collaboration between educator preparation programs, districts, and research organizations. Below are collaboration options designed to produce practical tools and publishable evidence while centering equity, privacy, and educator agency.

1. Build and Evaluate a GenAI-Powered Simulation Suite for Student Interaction Leadership

Develop a suite of GenAI-enabled, scenario-based simulations focused on high-impact interaction skills (de-escalation, restorative conversations, family communication, coaching). The design should align with leadership and teaching standards and incorporate strong governance guardrails (U.S. Department of Education, Office of Educational Technology, 2024; UNESCO, 2024).

Evaluation should include usability and safety testing (bias and harmful content checks), short-term performance metrics within scenarios, and longitudinal transfer measures during residencies and early career practice. Publishing results would address a major evidence gap: whether GenAI can create scalable, high-quality “practice spaces” for relational leadership skills.

2. Create a Tiered Micro-Credential Pathway for AI-Ready Teaching and Leadership

Design stackable micro-credentials that progress from foundational AI literacy to pedagogical integration and then to governance and leadership competencies. UNESCO’s competency framework and validated self-efficacy measures (e.g., TAICS) can help define competency targets and assessment approaches (UNESCO, 2024; Chiu et al., 2025).

To improve equity, the pathway should include options for free or low-cost participation and should be usable in both pre-service and in-service contexts. Partnership with districts can ensure coherence with local policy and tool availability.

3. Launch a Faculty and Mentor Teacher Development Consortium

Because faculty capacity is a primary bottleneck (Weiner et al., 2024), a consortium model can accelerate diffusion of practice. The consortium could develop shared curricular resources (assignments, assessment redesign templates, scenario libraries), provide facilitated communities of practice, and support institutional policy development aligned to federal and international guidance (U.S. Department of Education, Office of Educational Technology, 2024; UNESCO, 2023).

A research component would test which faculty development approaches are most effective (e.g., structured rehearsal of AI-integrated assignments, co-design studios, peer coaching) and how these approaches impact preservice teacher competence.

4. Establish a Research-Practice Partnership for Equity-Centered Implementation

District adoption and training trends suggest rapid growth alongside inequities in access and use (RAND Corporation, 2024, 2025). A research-practice partnership could focus on implementation supports for high-poverty schools and rural contexts, including tool access, infrastructure constraints, and culturally responsive pedagogy. Such a partnership would be well-positioned to produce actionable guidance (policy templates, procurement checklists, PD scope-and-sequence) while also generating publishable evidence on what works, for whom, and under what conditions.

Conclusion

GenAI is now a durable feature of educator work. Evidence continues to show that educator preparation programs are adapting, but often slowly and defensively, constrained by faculty capacity and uncertainty about best practices (Weiner et al., 2024). In-service PD is expanding quickly, driven by district need and a growing ecosystem of providers, yet access and impact remain uneven (RAND Corporation, 2024, 2025).

The next phase of progress will depend on shifting from tool adoption to capacity building: professional judgment, ethical governance, equity-centered implementation, and, critically, practice-based learning for the relational work at the heart of teaching and leadership. Strategic collaborations that build and rigorously evaluate GenAI-enabled practice spaces can help move the field toward responsible, evidence-informed integration that benefits educators and learners alike (UNESCO, 2023, 2024; U.S. Department of Education, Office of Educational Technology, 2024).

References

- American Federation of Teachers. (2025, July 8). *AFT launches National Academy for AI Instruction to support educators with AI training and tools* [Press release].
- Andersen, G., & Yang, S. (2025). A survey of K–12 teachers' perspectives on teaching with generative artificial intelligence. *The Advocate*, 30(2), Article 3. <https://newprairiepress.org/advocate/vol30/iss2/3>
- Bae, H., Hur, J., Park, J., Choi, G. W., & Moon, J. (2024). Pre-service teachers' dual perspectives on generative AI: Benefits, challenges, and integration into their teaching and learning. *Online Learning Journal*, 28(3), 131–156.
- Blonder, R., Feldman-Maggor, Y., & Rap, S. (2024). Are they ready to teach? Generative AI as a means to uncover pre-service science teachers' pedagogical content knowledge and enhance their preparation program. *Journal of Science Education and Technology*.
- Brandão, A., Pedro, L., & Zagalo, N. (2024). Teacher professional development for a future with generative artificial intelligence: An integrative literature review. *Digital Education Review*, 45, 150–157.
- Chiu, T. K. F., Ahmad, Z., & Çoban, M. (2025). Development and validation of teacher artificial intelligence (AI) competence self-efficacy (TAICS) scale. *Education and Information Technologies*, 30, 6667–6685. <https://doi.org/10.1007/s10639-024-13094-z>
- Daher, R. (2025). Integrating AI literacy into teacher education: A critical perspective paper. *Discover Artificial Intelligence*, 5, Article 217. <https://doi.org/10.1007/s44163-025-00475-7>
- 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.
- International Society for Technology in Education. (n.d.). *GenerationAI*. Retrieved February 28, 2026, from <https://iste.org/generationai>
- ISTE+ASCD. (n.d.). *Leading in the age of AI*. Retrieved February 28, 2026, from <https://iste.ascd.org/leading-in-the-age-of-ai>
- Kinder, A., Briese, F. J., Jacobs, M., Dern, N., Glodny, N., Jacobs, S., & Leßmann, S. (2025). Effects of adaptive feedback generated by a large language model: A case study in teacher education. *Computers and Education: Artificial Intelligence*, 8, 100349. <https://doi.org/10.1016/j.caeai.2024.100349>

- Lu, J., Zheng, R., Gong, Z., & Xu, H. (2024). Supporting teachers' professional development with generative AI: The effects on higher order thinking and self-efficacy. *IEEE*.
- Microsoft. (2026, January 14). *Introducing Microsoft innovations and programs to support AI-powered teaching and learning*. Microsoft Education Blog. <https://educationblog.microsoft.com/en-us/2026/01/introducing-microsoft-innovations-and-programs-to-support-ai-powered-teaching-and-learning/>
- Microsoft. (n.d.). *AI for educators*. Microsoft Learn. Retrieved February 28, 2026, from <https://learn.microsoft.com/en-us/training/paths/ai-educators/>
- National Institute of Standards and Technology. (2024). *Artificial Intelligence Risk Management Framework: Generative AI profile*. <https://www.nist.gov/itl/ai-risk-management-framework/generative-ai-profile>
- Nyaaba, M., & Zhai, X. (2024). Generative AI professional development needs for teacher educators. *Journal of AI*, 8(1), 1–13.
- Panday-Shukla, P. (2025). Exploring generative artificial intelligence in teacher education. *Teaching and Teacher Education*, 165, 105088.
- RAND Corporation. (2024). *Uneven adoption of artificial intelligence tools among U.S. teachers and principals in the 2023–2024 school year*. https://www.rand.org/pubs/research_reports/RRA134-25.html
- RAND Corporation. (2025). *More districts are training teachers on artificial intelligence: Findings from the American School District Panel*. https://www.rand.org/pubs/research_reports/RRA956-31.html
- Sposato, M. (2025). Artificial intelligence in educational leadership: A comprehensive taxonomy and future directions. *International Journal of Educational Technology in Higher Education*, 22, Article 20. <https://doi.org/10.1186/s41239-025-00517-1>
- U.S. Department of Education, Office of Educational Technology. (2024, October). *Empowering education leaders: A toolkit for safe, ethical, and equitable AI integration*. <https://files.eric.ed.gov/fulltext/ED661924.pdf>
- UNESCO. (2023). *Guidance for generative AI in education and research*. <https://unesdoc.unesco.org/ark:/48223/pf0000386693>
- UNESCO. (2024). *AI competency framework for teachers*. https://unesco-asp.dk/wp-content/uploads/2025/02/AI-Competency-framework-for-teachers_UNESCO_2024.pdf
- University of California, Irvine School of Education. (n.d.). *AI in Education certificate program*. Retrieved February 28, 2026, from <https://education.uci.edu/ai-in-education-certificate-program>
- University of San Diego Professional and Continuing Education. (n.d.). *Advanced certificate in AI integration for educational leadership*. Retrieved February 28, 2026, from

<https://pce.sandiego.edu/advanced-certificate-ai-integration-educational-leaders-hip/>

Weiner, S., Lake, R., & Rosner, J. (2024, October). *AI is evolving, but teacher prep is lagging: A first look at teacher preparation program responses to AI*. Center on Reinventing Public Education.

<https://crpe.org/wp-content/uploads/Teacher-Prep-AI-2024.pdf>

Wen, W., & Wen, H. (2024). Bridging generative AI technology and teacher education: Understanding preservice teachers' processes of unit design with ChatGPT. *Contemporary Issues in Technology and Teacher Education*, 24(4).