

A Strategic Research Agenda for AI-Driven Transformation in Public Education

Robin Lake and Shira Haderlein

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The Situation: A Field Rich in Tools but Short on Vision, and Full of Wicked Opportunities to Improve Learning

Generative AI carries the real risk of exposing students to “wicked problems” like data or identity theft, cognitive offloading, and existential threats to their future employment if AI replaces jobs at a mass scale. But it also holds the potential to create “[wicked opportunities](#)” by helping to solve problems that have plagued public education for decades: boring or irrelevant student experiences, a “[leaky pipeline](#)” in core subjects like math where students who fall behind never catch up, expensive and often ineffective special education programs, burnt-out teachers, generic approaches to instruction that do not address students’ unique needs, and high schools that are disconnected from promising career pathways. The limit of these opportunities is only our imagination. We, as education researchers, believe that the risks are real and merit significant research attention, much of which is underway. However, this research agenda is designed to provide a strategic roadmap for harnessing the wicked opportunities that AI presents.

Schools should be more human, not less. Learning environments should be joyful and rooted in real human and community connection, with instruction that is relevant to the civic life and careers young people will actually face in the Age of AI, grounded in data and evidence, and built around the reality that students are unique individuals with varied needs. Every design choice should be tested against one question: does it expand opportunity and flourishing for every student, or only some?

Four gaps define the current moment and prevent us from realizing this future:

The vision gap. There is no shared or prevalent definition of what AI should accomplish for students across school systems, states, or the broader education field. Developers build products that solve discrete problems without a clear theory of how those products contribute to a coherent learning system or a broader vision for the future of schooling. Districts often buy what neighboring districts have bought or what vendors recommend, rather than what best aligns with their educational goals and long-term strategy. The result is a marketplace flooded with point solutions that address discrete tasks instead of the deeper challenges of student disengagement, teacher burnout, and persistent inequity. The field is accepting AI-powered versions of the schools already in place rather than asking harder questions about what school should be.

The coherence gap. AI tools often arrive in classrooms as standalone additions to an already fragmented instructional environment. Too few districts and states have developed the leadership capacity, governance structures, and implementation strategies needed to integrate these tools into a coherent system of teaching and learning. Teachers are left to stitch together a core curriculum, supplemental programs, tutoring services, and new AI products, few of which were designed as part of a larger learning system. Schools serving students with the greatest needs—students with complex learning profiles, students in chronic poverty, and English learners—lack both the tools designed to meet these students’ needs and the capacity to use what exists. Equity is an afterthought in product design when it should be a key design consideration.

The quality gap. The evidence base for AI in education remains thin, fragmented, and poorly aligned with the decisions educators and policymakers need to make. The field has no agreed-upon way to measure the outcome that matters most: students moving on to college or career with the creative and social skills they need to adapt to an AI-enabled world. There is also no shared infrastructure for educators and system leaders to learn from each other. As a result, the field lacks a shared way to assess and communicate about whether AI is improving the experiences and outcomes that matter most for students. Even where strong evidence exists, education has repeatedly struggled to translate research into widespread changes in policy and practice, making evidence use as important a challenge as evidence generation.

The leadership and policy gap. Even where leaders have a compelling vision for the role of AI in education, few have clear roadmaps for translating that vision into coherent organizational change. District and state leaders are being asked to make decisions about AI adoption, governance, professional learning, procurement, staffing, and community engagement in an environment where evidence remains limited, and the technology is evolving rapidly. Without clear policy and implementation guardrails, educators cannot innovate safely, and without evidence requirements, developers have little incentive to invest in rigorous evaluation. States must build the leadership capacity, implementation strategies, and organizational conditions necessary to transform teaching and learning at scale.

These gaps converge around a single structural problem. AI is being layered onto existing systems rather than used to redesign them. The challenge is not simply adopting new technologies, but rethinking how learning, teaching, support, and opportunity are organized for students. Left on its current trajectory, the risks are serious. AI threatens to widen the gap between well-resourced and under-resourced schools, further entrench factory-model instruction at scale, and hand disproportionate power to AI companies whose profit incentives do not necessarily align with the goals of public education. Growing skepticism from parents, teachers, and students, many of whom do not see the value of using AI and do not feel included in decisions about the technology's adoption, signals that the window for building trust and legitimacy may be closing.

But this moment is also genuinely consequential. With resolve and evidence, education leaders could shift this trajectory. AI could finally help close the persistent gap between what the science of learning tells us works and what teachers actually do. It could assist in transforming high school into something engaging and relevant, not a waiting room before real life begins. It could support more personalized pathways through learning, enable new staffing models that extend the reach of excellent educators, strengthen connections between school and work, and provide students with more timely and individualized support. It could help revolutionize how schools serve students with complex learning needs. It could aid in making the job of teaching joyful again, grounded in the strong student-adult relationships that young people are starving for. It could help ensure that all students, not just those lucky enough to land in the right classroom, live up to their full potential.

The technology to do much of this is already here. The question is whether the education field has the will to drive toward those possibilities and away from the risks. That will require funders, policymakers, and system leaders to act with more coherence, ambition, and capacity than the field has shown so far.

Why Research Matters Now

Research alone will not transform education. Neither will technology. But the right research investments, made now, could be the difference between a field that muddles through and one that learns its way forward.

A targeted evidence base can do three things that advocacy, funding, and policy cannot accomplish on their own..

- First, it can **shift the policy environment** by providing the empirical grounding needed to move from vague acceptable-use guidelines to affirmative policy frameworks that tell educators what they can do, not just what they cannot.
- Second, it can **build field capacity** by generating the knowledge that districts and states need to make smarter decisions about implementation, governance, and school redesign.

- Third, it can **de-risk the bold bets**. Whole-school redesign, new staffing models, and AI-native career pathways will not reach scale without proof of concept that reassures skeptical communities, risk-averse school boards, and funders who need to justify investments.

The timing matters. The tools are proliferating whether or not we build the evidence base. If researchers are not embedded in this work now, helping shape what gets built, evaluated, adopted, and scaled, then the decisions will be made without them. The market will not wait.

High-Priority Research Questions

Early evidence suggests that AI has the potential to personalize learning, expand access to high-quality support, strengthen student agency, and free educators to focus more of their time on relationships and deeper learning. But technology alone does not transform schools. CRPE's decades of research on school improvement, innovation, and system redesign suggest that outcomes depend as much on organizational conditions, leadership, implementation, policy environments, and incentives as they do on the tools themselves.

The highest-priority research questions are therefore not only about whether AI works; they are about the conditions under which AI can help schools become more equitable, effective, and responsive to student needs. Schools, markets, and technology developers are unlikely to ask these questions on their own, even though the answers could shape the future of public education.

These high-priority research questions fall into three categories:

- **Measurement and Policy:** Research that establishes the evidence, governance structures, and policy conditions needed for responsible innovation.
- **Coherence and Scale:** Research that helps educators, schools, and districts use AI to better support teaching, learning, and student success.
- **Whole school redesign:** Research that asks how AI can enable fundamentally different models of learning, teaching, and schooling.

The research priorities that follow should not be read as an endorsement of any single approach to evidence generation. AI is evolving quickly, and education has often struggled to translate research into practice, even under normal circumstances. The field needs multiple forms of evidence, including rigorous evaluations, embedded R&D, and rapid-cycle learning. The most valuable evidence will come from research embedded in the implementation and continuous improvement of AI-enabled models, with researchers working alongside the educators, developers, and system leaders who are driving transformation on the ground.

Measurement and Policy

1. Measurement: You Get What You Measure

One of the most consequential choices the education field will make in the next few years is what to count as student success. If assessments continue measuring only what they have always measured, AI will be judged solely on its ability to improve standardized test scores, not on its ability to drive fundamental change within teaching and learning. The field urgently needs valid, reliable measures of the outcomes that matter in the age of AI, like students' abilities to be creative, solve problems collaboratively, self-direct their learning, and connect with others, alongside traditional academic indicators. A broader taxonomy that outlines what the field means by "AI in schools" and what skills and competencies students will need in the Age of AI is essential for policy, research, and implementation. This is the foundation of the evidence infrastructure that will determine what the field learns, rewards, scales, and ultimately values.

Example priority research questions:

- What range of student outcomes do future-ready schools truly require? Is there empirical basis for prioritizing human relationships and connections in the Age of AI? How can such skills be best measured?
- What interim, embedded, and alternative assessments, valid and reliable across contexts, can capture that full spectrum?
- What measurement frameworks could funders adopt as conditions for investment and policymakers as conditions for procurement to shift market incentives toward quality?

2. Governance, Market Structure, and Policy R&D: Building Accountability and a Permission Structure for Future-Ready Education

Two of the least-examined questions facing AI in public education are about government and policy. Who will shape the rules, incentives, and infrastructure guiding AI adoption, and how can those systems serve the public interest?

AI infrastructure in public education is concentrating rapidly in the hands of a small number of for-profit AI and ed-tech companies whose incentives do not always align with the goals of public education. At the same time, policy frameworks built for a different era, including seat-time requirements, staffing ratios, assessment mandates, and credentialing rules, constrain schools that are trying to redesign learning. Governance is more than just regulation. It is also the permission infrastructure that provides flexibility while maintaining appropriate guardrails. Effective governance builds public trust, helps systems navigate change, creates incentives for responsible innovation, and develops the capacity to learn and adapt as technologies evolve. The next five years may be the best opportunity to shape how AI is governed in public education before market concentration, regulatory inertia, and institutional habits become significantly harder to change.

Example priority research questions:

- What state leadership and policy strategies are most effective for supporting coherent AI adoption?
- What kinds of regulatory flexibilities and enabling conditions are required for true experimentation?
- What accountability and equity guardrails are necessary to ensure that student access is fair and open, and to protect marginalized student populations from harm?
- What governance, transparency, and community engagement practices build public trust and legitimacy while supporting responsible AI innovation?

3. Vision Setting, Leadership, and Change Management

Few education leaders have been prepared for the challenge of leading AI-enabled change. Districts and states must make decisions about vision, governance, implementation, professional learning, staffing, and community engagement while technologies continue to evolve rapidly. Innovation efforts are most successful when they begin with a [clearly defined problem](#) rather than a new tool. Schools that adopt AI for its own sake often struggle to generate meaningful change, while those that use AI to address specific challenges are more likely to see lasting benefits. Education has developed a substantial body of knowledge about organizational change, implementation, and continuous improvement. Yet too often, that knowledge has failed to translate into lasting system transformation. AI presents a new opportunity to understand how existing evidence on leadership and change can be applied to a successful redesign of schools. Understanding how leaders build trust, align stakeholders, create organizational coherence, and foster continuous learning will likely be as important as understanding the technologies themselves.

Example priority research questions:

- How can districts and states apply evidence from implementation science and organizational change to lead AI-enabled school improvement successfully?
- What leadership, change-management, and stakeholder-engagement strategies build trust and support sustained implementation?
- How can schools and systems build the capacity to learn, adapt, and improve continuously as AI technologies evolve?

Coherence and Scale

4. Translating Learning Science into Practice at Scale

The gap between what teachers actually do in classrooms and what the science of learning tells us works is one of the oldest and most stubborn in education. Decades of research on cognitive load, retrieval practice, feedback timing, productive struggle, and formative assessment have produced robust findings. But there is no reliable way to translate this research into practice. AI is the first technology that could plausibly close that gap, but only if AI is deliberately built and implemented on a foundation of evidence and continuously evaluated to ensure it is improving teaching and learning. In addition to translating the best available evidence and learning science into instructional practice, AI also offers the possibility of tailoring evidence-based approaches to individual learners through precision learning. This would enable educators to provide the right supports, learning experiences, and feedback to the right students at the right time, based on their individual needs and progress.

Example priority research questions:

- How can AI-enabled coaching and feedback tools shift teacher practice toward evidence-based approaches and learning science?
- What does effective implementation look like at the school and system level? What organizational conditions, leadership practices, and professional learning structures are necessary for AI-enabled instructional improvement to persist and scale over time?
- Under what conditions do teachers experience AI-supported instructional coaching and feedback as genuinely useful rather than as surveillance, and what design and trust-building features make the difference?
- How can learning experiences and tools be designed to create intentional opportunities for deep and lasting learning while avoiding cognitive offloading or cognitive abandonment?
- What data, learning science, and AI capabilities are needed to connect each student with the right learning experiences, supports, and opportunities at the right time and at scale?

5. Coherence: What Actually Makes AI Work in Schools

The literature on implementation in education is unambiguous: the same intervention can produce strong results in one context and negligible results in another. AI is no different. The field currently knows very little about the conditions under which AI tools actually produce meaningful gains, and even less about what coherent, school-wide AI integration looks like in practice versus on paper. Most schools are not implementing just one AI tool—they are navigating an increasingly complex ecosystem of technologies, programs, and instructional priorities. Understanding how those pieces fit together is essential for successful implementation of AI.

Example priority research questions:

- Under what implementation conditions do leading AI tools have the greatest impact on student learning? What explains the variation in results across classrooms and schools?
- What data governance, privacy policy, and interoperability standards would enable the kind of cross-tool coherence that teachers and students actually need?
- How can schools and districts build the capacity to continuously evaluate, adapt, and improve their use of AI as technologies, evidence, and needs evolve?
- What continuous improvement and accountability mechanisms help schools evaluate AI initiatives, discontinue ineffective approaches, and adapt as evidence evolves?

6. Students with Diverse Learning Needs: The Greatest Opportunity and the Highest Stakes

If used well, AI could most benefit students with disabilities, English learners, students managing trauma or experiencing chronic disengagement, and other students with complex and intersecting needs. If used incorrectly, the technology could harm those students the most. The current system fails these students at scale: IEP development is compliance-driven rather than learning-driven, specialized support is rationed by capacity rather than need, and the assumption that one teacher can meet every student's needs in a single classroom was never realistic. AI's capacity for genuine individualization, persistent monitoring, and adaptive support could change this. But almost none of the tools currently on the market were designed with these students in mind, and the risk of algorithmic bias, misidentification, and substituting technology for human relationships is acute. This is also where the mental health and social connection crises land hardest, and where the equity stakes are most visible: chronically absent students, students in crisis, and students who have stopped believing school is for them are disproportionately the students the system has already failed most severely.

Example priority research questions:

- Which AI tools and approaches are showing genuine promise for students with specific disabilities, English learners, and students with trauma histories, and under what conditions do those gains hold across diverse school contexts?
- How can AI transform IEP development and implementation from a compliance exercise into a genuine individualized learning system, and what policy and professional capacity changes does that require?
- How can AI tools personalize ESL support for English learners in ways that account for the diversity of the English-learning population?
- Can AI tools meaningfully increase the ability of low-income families and families from historically vulnerable backgrounds to navigate complex school and special education systems and learning options on behalf of their children, and what design and trust-building features make the difference?

Whole School Redesign

7. New Educator Models: Rethinking Who Teaches and How

AI will undoubtedly change the teaching profession, but we don't yet know whether the technology will improve outcomes for teachers and students or further demoralize an already-stressed workforce. In a world where AI can handle the routine cognitive work of instruction, the one-teacher, one-classroom model is more of a relic than ever before. The field needs evidence on new staffing and professional learning models before they reach scale, not after. Equity runs through this priority too: without deliberate strategy, the schools with the most resources will attract and develop AI-fluent educators while under-resourced schools are [left behind](#). Example priority research questions include:

Example priority research questions:

- What new educator roles, staffing structures, and school designs emerge in AI-enabled learning environments, and how do they affect student outcomes, educator satisfaction, and organizational effectiveness?
- What preparation and professional learning do teachers actually need to dramatically improve their instruction for the age of AI?
- What new career pathways, leadership roles, and credentialing frameworks could attract, develop, and retain a diverse educator workforce in an era of AI-enabled schooling?

8. Curriculum Relevance and Student Agency: Rethinking What Students Learn and Who They Become

Researchers must also ask whether the goals, content, and experiences of schooling remain appropriate for a rapidly changing world. State standards were designed for a different economy and a different set of civic demands. At the same time, students are already using AI constantly, mostly outside of school and with little adult guidance. Rather than simply using AI to deliver the existing curriculum more efficiently, research must examine how AI can support more relevant, connected, authentic, and engaging learning experiences that enable students to develop the agency, judgment, and adaptability to thrive in an ever-shifting future.

Example priority research questions:

- How can schools create learning experiences that cultivate curiosity, creativity, problem-solving, and student agency in a world where AI can increasingly perform routine cognitive tasks?
- How are leading employers and postsecondary institutions actually using credentials and transcripts to make decisions, and how far does that diverge from what schools are currently certifying?
- What does meaningful AI literacy look like across grade levels, and under what conditions does student AI use build deeper learning and agency rather than circumvent the cognitive struggle that produces durable understanding?

- How do students across races and ethnicities, incomes, language backgrounds, and learning profiles experience AI tools differently, and what are the equity implications for teaching AI literacy and designing for student agency?
- Which emerging AI-enabled school models are showing promise for improving student learning, engagement, and opportunity, and what conditions are required to adapt and scale them across diverse contexts?

What Success Looks Like

Five years from now, a successful research agenda will have produced more than just a library of studies—it will have shifted the conditions under which AI in education operates. Procurement decisions will be grounded in evidence rather than relationships. Funders will require valid measures of full-spectrum student outcomes. State policies will enable rather than stall coherent innovation. And a handful of whole-school designs, tested rigorously and built for scale, will give education leaders something real to point to when communities ask what AI-transformed schooling looks like for their schools.

That future is reachable, but it requires researchers who are willing to get embedded in this work early, funders who are willing to require evidence generation as a condition of investment, and system leaders who are willing to treat the answer to “what works” as an open empirical question rather than a vendor claim. The urgency is real. So is the opportunity.

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ABOUT CRPE

The Center on Reinventing Public Education (CRPE) is a research organization at Arizona State University's Mary Lou Fulton College for Teaching and Learning Innovation, where transformative ideas are rigorously examined and tested, and research informs action. Since 1993, we have remained independent of any single ideology while holding firmly to our core belief that public education is a goal—to prepare every child for citizenship, economic independence, and personal fulfillment—and not a particular set of institutions. From that foundation, we study what it will take for public education to meet every student's needs and use those insights to inform meaningful changes in policy and practice. Learn more about our work at crpe.org.