Emma Eccles Jones College of Education & Human Services
Center for the School of the Future
UtahState University®

Personalized and Powerful: How AI Can Transform Student Learning in Utah Classrooms

August 2025

#2 of 4 AI Policy Briefs

The purpose of the Center for the School of the Future is to promote empirically validated practices in public education systems and to encourage cooperative and research relationships between K-12 and higher education institutions.

Executive Summary

Utah's K-12 education system has a long history marked by a litany of "magic wand solutions" (Tucker, 2019) that ultimately failed to meaningfully improve student achievement. Artificial Intelligence (AI) is the latest innovation on the horizon. Are AI proponents too audacious in their expectations for what AI can achieve in student learning (Center for the School of the Future, 2025)? Is AI simply another magic wand solution or is it fundamentally different and more powerful? Does it possess greater inherent potential to elevate student outcomes (Kestin et al., 2025)? Objectively, it's far too early to tell. The implementation and evaluation of the impact of AI in education is still in its infancy (Riordan et al., 2023). For AI to be fairly assessed, implementation must be strong, intentional, sustained, and adaptable. Many past innovations became "magic wand" solutions not because they lacked promise, but because poor implementation doomed them from the outset.

Some suggest that AI is more than just another innovation—sufficiently poised to elevate Utah's K–12 education system, by achieving a base threshold of 100% proficiency in foundational student learning, such as reading, mathematics, science, and written expression (CSF, 2025; Bonfire Leadership Solutions, 2025; SchoolAI Blog, 2025). Utah's educational system should not continue to achieve sub-threshold levels of academic achievement (such as the <50% proficiency rate on the 2023–24 RISE assessment) declarations of universal proficiency, which currently remain an astronomically distant goal (Nelson, 2024). Instead, the mission should focus on students genuine academic excellence.

Of course, the hypothesis that AI propels academic excellence must be tested, and this work has begun.

Excellence in learning means more than meeting proficiency thresholds on standardized assessments like RISE and Acadience (CSF, 2025). It includes additional indicators of learning excellence (Johnson & Layng, 1996), such as, accurate application of knowledge and skills in the right context, fluent performance with reduced cognitive load, durable retention over time, sustained performance (endurance), consistent results (stability), transfer across varied contexts, and the ability to produce new knowledge or skills without direct instruction. After all, knowledge and skills that are forgotten, unstable, or unusable offer little in the way of meaningful learning (Kalyuga, 2007). A high-performing education system should consistently deliver more learning, better learning, faster learning, more cost-effective learning, and learning that transfers to real-world contexts.

Utah's Current State of Student Learning

The traditional de-personalized instructional model—one teacher delivering uniform instruction in Utah to 25–30 students—carries inherent limitations (CSF, 2025; SchoolAI Blog, 2025). It requires teachers to teach at roughly the same pace and in the same way, despite the fact that students arrive with vastly different and complex backgrounds of varying levels of prerequisite knowledge and skills, vocabulary and conceptual understanding, behavioral traits, and socio-emotional capacities. The list of individual

differences is extensive. Though not the intention of educators or stakeholders, the system's treatment of students is akin to a physician treating a waiting room full of patients with the same medication, regardless of their unique medical conditions (Dumont et al., 2023). In contrast, modern medicine, particularly in the treatment of cancer, has made significant strides toward personalization. It has moved beyond one-size-fits-all protocols to effective targeted therapies based on the genetic, molecular, and immune profiles of individual patients. Advances in genomic sequencing, biomarker identification, and immunotherapy now allow oncologists to match treatments to the specific characteristics of each patient's tumor, improving outcomes and reducing unnecessary side effects. While education cannot afford to assign a teacher to every student in a 1:1 high-leverage tutoring model, the hypothesis is that AI may enable schools—and the teachers within them—to personalize learning at a scale and depth never before possible.

In an era of global challenges, Utah students must pursue world-class academic excellence that is demonstrated by strong performance on international benchmarks like PISA. Yet even PISA captures only part of students' intellectual potential, omitting critical abilities such as creating innovative products, services, and solutions to real-world problems and opportunities. Both national indicators like the National Assessment of Educational Progress (NAEP) and international assessments like Programme for International Student Assessment (PISA) underscore a pattern of learning stagnation in the United States (Nelson, 2024; Tucker, 2019). While Utah out performs the national average (e.g., ranking 7th in 4th-grade reading on the 2022 NAEP), this performance remains insufficient when statewide proficiency rates in core subjects continue to hover around 45–50%. Utah's

2021–2024 RISE assessment results for grades 3–8 reflect this plateau: Language Arts proficiency increased by just 0.9 percentage points, Mathematics by 0.9, and Science by 2.1 —this leaves most students below proficiency and true academic excellence out of reach under current conditions. Internationally, PISA ranks U.S. student learning below that of 25 participating countries in mathematics, 9 in science, and 5 in reading.

Utah's Needed State of Student Learning

To address the low foundational proficiency rates of Utah students, we must prioritize the development of core academic skills while reaching aggressively and fearlessly for learning excellence (Nelson, 2024; Tucker, 2019). Utah needs academically equipped students who can tackle complex global challenges with confidence. Though empirical evidence is still emerging, the hypothesis to be tested is whether this vision can be realized through the thorough, deep, and sustained implementation of AI as a symbiotic partner—not merely a tool, but an augmentative collaborator—with teachers (Learning Ideas Conference, 2024). Under teacher supervision, the hypothesis holds that personalized AI can provide every student with both a highly qualified teacher and an expert AI tutor, offering real-time feedback, adaptive pacing, and responsive retrieval practice in both massed and distributed formats, all tailored to individual learning data— past and present (Kestin et al., 2025; SchoolAI Blog, 2025). Additionally, instruction must incorporate challenges and "desirable difficulties" (Bjork & Bjork, 2011) that ignite and sustain intellectual curiosity, while ensuring the long-term retention of foundational academic knowledge and skills that serve as the bedrock for achieving high levels of learning excellence and real-world application.

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With a strong commitment to moving beyond proficiency toward true excellence—and in alignment with the July 2025 Winning the Race: America's AI Action Plan, which asserts that "…AI will enable radically new forms of education,"—Utah should pilot the intentional and deeply integrated use of AI in select classrooms. This initiative should not seek to replace teachers, but instead should empower them as a tireless, intelligent, and symbiotic partner. The promise of AI lies in its ability to scale personalized instruction. This ensures that all students reach proficiency while accelerating advanced learners toward excellence that is grounded in empirical research from cognitive, learning, behavioral, neural, motivational, developmental, and other relevant sciences (SchoolAI Blog, 2025; Dumont, Istance, & Benavides, 2023).

AI systems, powered by machine learning and natural language processing, can dynamically adapt to Utah student need, delivering explicit instruction (e.g., research-based direct teaching), frequent assessments with visual charting (e.g., trends and trajectories for self-monitoring), data-driven decision-making, and targeted retrieval practice. These features reflect what Bloom identified in high-quality 1:1 human tutoring settings, where the "2 Sigma" effect—raising the average learner two standard deviations above peers—is now potentially scalable through AI (Kestin et al., 2025). Teachers, relieved of time-intensive rote tasks (e.g., grading), empowered to mentor, design rich learning experiences, and facilitate deeper applications, co-creating classrooms where human and artificial intelligence work together to elevate learning.

An Idealized Utah AI Embedded Classroom

Now, imagine a 3rd-grade classroom with 25 students from diverse backgrounds—including those with disabilities, English learners, students experiencing homelessness, and those with behavioral challenges. Embedded AI uses K–12 data and real-time insights to help teachers pace instruction toward 100% proficiency on Acadience and RISE assessments in 150 days instead of 180. Envision explicitly co-developed and co-delivered lessons that promote long-term retention through distributed practice, with homework probing students' ability to generalize learning across settings. Picture students collaborating across achievement and progress levels without delay or restriction, advancing at their own pace while supporting peers. Imagine AI scaffolding new teachers early in their careers, gradually fading support as their instructional expertise grows. Envision instruction and learning activities that are effective, efficient, and engaging—where students clamor to participate and lament missing school on holidays and snow days. Finally, imagine a classroom where a teacher and AI work in harmony to meet student learning needs, and where acceleration to excellence—such as applying skills to real-world challenges like energy production to support proliferation of AI and the energy-hungry data centers meaningful to 3rd graders—is not a lofty aspiration, but an achieved reality. Also, imagine this teacher and AI co-enabling the following in the classroom:

- **Remediation:** Enhancing instruction with explicit teaching, distributed/massed practice cycles until proficiency is achieved and then maintained, reducing the need for later instructional re-work.

- **Acceleration:** Custom pathways for advanced learners to achieve world-leading levels of learning.

- **Engagement:** Interactive, responsive learning tailored to students' curiosity zones and focal curiosities, showing strong

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promise in early research, though further studies are needed to confirm with K–12 populations.

Evidence Flowing from Early AI Embedded Results: The Future Is Already Happening

Evidence is beginning to accumulate on the benefits of AI implementation in K–12 learning environments (Kestin et al., 2025; SchoolAI Blog, 2025; Wang et al., 2024; Bonfire Leadership Solutions, 2025). However, these findings must be considered alongside the legitimate concerns raised by educators, administrators, and students regarding AI use in schools. Strong leadership is essential to appropriately balance the significant potential value of AI in K–12 settings with critical considerations around student health, safety, and data security (CSF, 2025; Bonfire Leadership Solutions, 2025; Riordan et al.).

That balance should also include alignment with the America's AI Action Plan, which encourages states to nurture a "dynamic, try-first culture" in their educational systems—an imperative particularly suited to Utah's tradition of innovation and local empowerment.

The following research highlights early evidence of positive academic outcomes associated with AI integration in K–12 student learning:

- **Harvard RCT (2025):** AI-tutored K–12 students demonstrated double the mastery and engagement compared to peers.

- **Stanford's Tutor CoPilot:** Increased mastery for low-performing students by up to 9%, promoting greater equity.

- **Swiss University Study:** Reported 15 percentile point gains among AI-augmented learners.

- **Utah Pilots:** Local implementations show improved test scores and increased student engagement.

Moving Forward: A Call to Action

Utah can pioneer world-leading K-12 learning by:
- **Piloting with Urgency:** Launch AI embedded classrooms across student demographics that include a rapid supply of learning data to students and teachers that alters instructions and learning activities, and students' self-regulation of learning in real time.
- **Equipping Teachers:** Offer targeted professional learning to empower educators.
- **Ensuring Access:** Fund infrastructure (e.g., building on UEN) to close divides.
- **Leading Ethically:** Develop policies for data protection and dignity in AI use.
- **Aiming Higher:** Redefine metrics for acceleration, curiosity, and flourishing.
- **Implement Key Elements:** Review and begin implementing select elements of Advancing Artificial Intelligence Education for American Youth legislation.

The Center for the School of the Future (CSF) at Utah State University fully endorses the ambitious, evaluative "try first" vision outlined in this policy brief and supports the transformative integration of AI as a symbiotic partner in K–12 education. AI must be evaluated for its potential to propel Utah students toward true learning excellence. AI is more than a fleeting innovation, instead it is a promising catalyst for personalized learning.

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There are four AI policy briefs in this series.

AI Policy Brief 1
Building Smarter Classrooms to Achieve Higher Student Learning: Empowering Utah Teachers with AI Support (June 2025)

AI Policy Brief 2
Personalized and Powerful: How AI Can Transform Student Learning in Utah Classrooms (August 2025)

AI Policy Brief 3
Guardrails for the Future: Navigating AI's Risks in K–12 Education with Confidence and Care (September-October 2025)

AI Policy Brief 4
New Wine, New Wine Bottles: Rethinking and Redesigning Utah's Education Systems for the AI Era (November-December 2025)

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