U.S. Department of Education
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Request for Information on the Proposed Priority and Definitions-Secretary's Supplemental Priority and Definitions on Advancing Artificial Intelligence in Education

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Introduction

We, a group of scholars affiliated with the Stanford Institute for Human-Centered Artificial Intelligence (HAI) and the Stanford Accelerator for Learning, submit the following comments in response to your request for information. Our work, which spans AI research, education policy, and partnerships with educators, technologists, and policymakers, aims to ensure that AI technologies are developed and deployed in ways that strengthen student achievement, expand opportunity, and support evidence-based decision-making.

Federal priorities for AI in education should drive innovation, reflect the realities of state and local systems, and anchor policy in proven research. Our recommendations aim to support the Department's efforts to create conditions that enable schools, districts, and states to adopt AI in ways that improve outcomes and align with local priorities. These include:

1. Advance a research-practice ecosystem for effective use of AI in education.
2. Develop AI tools grounded in the learning sciences and built for education.
3. Broaden the vision for AI in education beyond individualized remediation.
4. Guide responsible AI innovation and adoption in education.

1. Advance a Research-Practice Ecosystem for Effective Use of AI in Education

AI technology is advancing rapidly. It is poised to transform education at all levels, eliciting a wide range of reactions among educators from eagerness to fear.[1] Yet a critical gap remains: We lack robust research on effective AI implementation strategies. For example, according to the Stanford GenAI and Education Research Repository, only 35 randomized controlled trials worldwide have been conducted on generative AI in education to date.[2] This gap between

[1] Ruishi Chen, Victor R. Lee, and Monica G Lee, "A Cross-Sectional Look at Teacher Reactions, Worries, and Professional Development Needs Related to Generative AI in an Urban School District," *Education and Information Technologies* 30 (February 2025): 16045, https://link.springer.com/article/10.1007/s10639-025-13350-w.
[2] SCALE Initiative, "Impact – Randomized Controlled Trial," Stanford Accelerator for Learning, accessed August 16, 2025, https://scale.stanford.edu/genai/repository/impact-randomized-controlled-trial.

technological potential and evidence-based practice risks hindering AI's positive impact on learning outcomes.

Many hyped technology innovations have lacked empirical grounding or meaningful K-12 contextualization and led to inconsistent outcomes and missed opportunities for meaningful learning enhancement.[3] Evidence suggests that U.S. adoption of generative AI is already outpacing adoption of the personal computer and the internet.[4] The federal government must avoid repeating previous education technology adoption mistakes. To do this, policymakers must support a structured approach that bridges academic inquiry with classroom practice.

Support sustained research-practice partnerships (RPPs): RPPs provide a proven model for sustained collaborations between academic institutions and K-12/postsecondary schools. As long-term collaborations that revolve around engagement with a wide range of expertise and research, they are crucial for developing evidence-based understanding of AI deployment and usage strategies in real learning environments.[5] These collaborations should go beyond basic efficacy studies to examine how AI tools align with pedagogical goals and impact long-term learning outcomes. Educators and students must be engaged as active participants in research and tool development, with learning sciences methodologies guiding the work.[6]

To be effective, RPPs require institutional support that incentivizes meaningful stakeholder participation. Partners must be given compelling reasons to engage in research partnerships, including a robust funding source and mutually beneficial outcomes such as data, professional development, and resource access. One notable example is CSforALL, an RPP program formerly supported by the National Science Foundation, which demonstrated how coordinated RPPs can drive systemic improvement in computer science education across school settings.[7]

One type of partnership involves establishing innovation testbeds. Developing trustworthy, secure, and context-sensitive AI systems for education requires infrastructure that supports iterative design, testing, and refinement in real-world classroom settings. This includes privacy-preserving data systems, support for varying levels of educator technical expertise, and

[3] Justin Reich, *Failure to Disrupt: Why Technology Alone Can't Transform Education* (Cambridge, MA: Harvard University Press, 2020.
[4] Alexander Bick, Adam Blandin, and David J. Deming, "The Rapid Adoption of Generative AI," September 2024, National Bureau of Economic Research, https://www.nber.org/papers/w32966.
[5] William R. Penuel and Daniel J. Gallagher, *Creating Research-Practice Partnerships in Education* (Cambridge, MA: Harvard Education Press, 2017).
[6] Nneka J. McGee et al., *AI + Learning Differences: Designing a Future with No Boundaries*, Stanford Accelerator for Learning, 2025, https://acceleratelearning.stanford.edu/app/uploads/2025/07/AI-Learning-Differences-Designing-a-Future-with-No-Boundaries_Final.pdf.
[7] CSforALL, accessed August 18, 2025, https://csforall.org/en-US.

access to implementation resources. Education researchers with expertise in design and implementation are critical for ensuring these testbeds are informed by established knowledge on school change and innovation.

To achieve this, the Department should establish and fund responsible AI education testbeds — beacon sites that serve as controlled yet authentic environments for responsible experimentation. These "classroom laboratories" would enable educators, students, and researchers to experiment with new schedules, diverse instructional modalities, and evolving teaching roles while piloting AI tools. It is important to note that these testbeds would require special accommodations to ensure privacy, the secure and responsible use of learner data, as well as pedagogy and instruction experimentation. By strategically locating these testbeds in diverse regions around the country, including urban and rural settings, charter and traditional public schools, we can help ensure that AI advances do not exacerbate existing educational inequalities but instead contribute to more equitable learning opportunities. The knowledge generated through these model environments can then be rapidly disseminated across the broader educational landscape, creating a cycle of continuous improvement that benefits from both rigorous research methods and practical classroom wisdom.

2. Develop AI Tools Grounded in the Learning Sciences and Built for Education

Effective use of AI in education depends not just on access to technology but on tools intentionally designed for teaching and learning. Federal policy should support systems that are co-developed with educators, aligned with the learning sciences, and responsive to real classroom needs.

Prioritize the development of AI tools explicitly designed for educational settings: These tools, including large language models and related technologies, should be custom-built to meet instructional needs rather than adapted from general-purpose AI systems such as ChatGPT, Gemini, or Claude. Educators have expressed concern that many current AI tools reflect outdated pedagogical assumptions and fail to address the needs of today's diverse learners and classrooms.[8] Targeted initiatives developed at Stanford University, such as *Tutor CoPilot, M-Powering Teachers*, *Coteach*, *Kai*, and *Write Path - AI*, demonstrate how AI can be designed to support individualized instruction, assist educators, measure real-time student progress,

[8] Bodong Chen et al., "Pedagogical Biases in AI-Powered Educational Tools: The Case of Lesson Plan Generators," *Social Innovations Journal* 30, no. 2 (April 2025): https://socialinnovationsjournal.com/index.php/sij/article/view/10004.

conduct real-time assessment, and ensure accurate alignment with current educational standards, while also elevating the teaching profession.[9]

Co-designing with educators and researchers is essential: A collaborative approach to technology design ensures that AI tools address real classroom needs and align with evidence-based teaching practices. Investments should focus on building education-specific datasets and performance benchmarks grounded in the learning sciences, so that AI effectiveness is evaluated based on classroom-relevant outcomes rather than abstract technical metrics. For example, Stanford's *CRAFT Initiative* works closely with teachers, administrators, and education researchers to collect classroom-relevant data and design AI tools that enhance feedback, planning, and instruction.[10] This kind of collaborative development, grounded in hands-on expertise and academic research, ensures that AI is pedagogically meaningful, not just technically impressive.

Promote open, interoperable education datasets anchored in effective pedagogy: The federal government should lead in establishing and advancing interoperability standards that enable robust, secure, and responsible sharing of educational data across public schools and districts. In addition, open datasets — designed with evidence-based pedagogy at their core — would allow educators, researchers, and innovators to learn from and build on what works, supporting continuous research and model improvement while fostering transparency and accountability. For example, the Ed-Fi Data Standard facilitates the seamless exchange of school data between different systems, enabling more customized and efficient uses of technology for teaching and learning.[11] By prioritizing both interoperability and data integrity, the education system can unlock innovative, data-driven solutions that truly benefit students.

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[9] See Tutor CoPilot, Stanford EduNLP Lab, accessed August 16, 2025, https://edunlp.stanford.edu/projects/tutor-copilot; M-Powering Teachers, Stanford EduNLP Lab, accessed August 16, 2025, https://edunlp.stanford.edu/projects/m-powering-teachers; Coteach, accessed August 16, 2025, https://coteach.ai/; Kai, "Learners with Disabilities Benefit from More Complex Reading Instruction, Stanford Researchers Say," accessed August 16, 2025, Stanford Graduate School of Education, https://ed.stanford.edu/news/learners-disabilities-benefit-more-complex-reading-instruction-stanford-researchers-say; Write Path - AI, "Seed Research Grants," Stanford Institute for Human-Centered AI, accessed August 16, 2025, https://hai.stanford.edu/research/grant-programs/seed-research-grants?section=2023-recipients.

[10] See Classroom-Ready Resources About AI For Teaching (CRAFT), Stanford University, accessed August 16, 2025, https://craft.stanford.edu/; Benjamin Xie et al., " Co-Designing AI Education Curriculum with Cross-Disciplinary High School Teachers" (proceedings of the 38th AAAI Conference on Artificial Intelligence, March 2024), https://doi.org/10.1609/aaai.v38i21.30360.

[11] Ed-Fi Data Standards, Ed-Fi Alliance, accessed August 16, 2025, https://docs.ed-fi.org/reference/data-exchange/data-standard/.

3. Broaden the Vision for AI in Education Beyond Individualized Remediation

There is no one-size-fits-all approach to advancing AI in education. The internet not only transformed access to information but also enabled entirely new forms of communication, commerce, and creativity. Similarly, the transformative potential of AI in education goes far beyond individualized tutoring.

Federal education policy on AI should move beyond narrow, remedial applications and embrace a broader vision — one that sees AI as a catalyst for collaboration, creativity, social-emotional learning, operation efficiency, and system-wide improvement. Realizing this potential requires distinguishing among educational priorities that include, for example, AI literacy for all students,[12] AI development skills for advanced learners,[13] creative and critical engagement with AI tools,[14] and preparation and training for teachers.[15]

To achieve this, federal investments should prioritize innovative, human-centered uses of AI that reflect the full complexity of teaching and learning.

Encourage AI for collaborative and project-based learning: AI can amplify teamwork and creativity by helping students design, build, and solve problems together. For example, AI tools could support student teams in creating simulations to demonstrate physics concepts or composing multimedia projects in emerging digital formats.[16] The Stanford Accelerator for Learning's "AI Tinkery" — a physical space where students, educators, and community members experiment with AI — offers one model.[17] Federal funding could seed similar innovation hubs nationwide, particularly in schools and community colleges, to empower educators and learners to experiment with tools in community-led, hands-on settings.

Advance human-centered learning with AI: Education is about more than knowledge — it fosters socialization, resilience, and relationships. AI can support these objectives by enabling role-play

[12] Duri Long and Brian Magerko, "What Is AI Literacy? Competencies and Design Considerations" (proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, April 2020), https://dl.acm.org/doi/10.1145/3313831.3376727.
[13] David Touretzky et al., "Envisioning AI for K-12: What Should Every Child Know about AI?" (proceedings of the 19th AAAI Conference on Artificial Intelligence, July 2019), https://doi.org/10.1609/aaai.v33i01.33019795.
[14] Yasmin B. Kafai et al., "What Does It Mean to Be Literate in the Time of AI? Different Perspectives on Computational Literacies for K-12 Education" (proceedings of the 18th International Conference of the Learning Sciences, June 2024), https://par.nsf.gov/servlets/purl/10526804.
[15] Chen, Lee, and Lee, "A Cross-Sectional Look."
[16] Kafai et al., "What Does It Mean to Be Literate in the Time of AI?"
[17] AI Tinkery, Stanford University, accessed August 16, 2025, https://ai-tinkery.stanford.edu/.

for conflict resolution, perspective-taking, and classroom climate insights for teachers. Therefore, federal investment should prioritize R&D for AI tools that:

- *Enable whole-child learning* that emphasizes flourishing as well as academic outcomes—through designs that build resilience, nurture durable skills, and remain developmentally appropriate and contextually relevant.
- *Augment — not replace — educator roles*, preserving human relationships, protecting and enhancing educator judgment, and strengthening student–teacher connections.
- *Meet human-centered design standards*, requiring the active involvement of educators in co-design and rigorous ethical and cultural review before deployment.

To protect professional judgment, federal guidance should make clear that recommendations made by AI tools must remain advisory, with teachers and school leaders retaining final decision-making authority. Over-automation, such as automated grading, behavioral monitoring, or replacing direct instruction, should be limited. Finally, federal investments should support professional development programs that equip educators to evaluate, adapt, and lead the responsible use of AI in their classrooms in ways that reinforce human connections at the core of learning.

Advance innovation for learners with disabilities and learning differences: Students with disabilities and learning differences are often underserved by one-size-fits-all approaches. AI tools can help personalize learning and provide scaffolds that adapt to individual needs. For example, tailored real-time captioning has been shown to improve comprehension and engagement for deaf and hard-of-hearing students; text-to-speech systems with adaptive pacing can assist students with dyslexia by making reading more accessible; emotion recognition software can help students with autism interpret facial expressions and social cues; and AI-driven augmentative communication can enable nonverbal students to participate more fully in class.[18] Federal efforts should capitalize on these opportunities to improve accessibility at scale, ensuring these innovations reduce — not widen — opportunity gaps.

[18] See Yasith Samaradivakara, "Tailored Real-Time AR Captioning Interface for Enhancing Learning Experience of Deaf and Hard-of-Hearing (DHH) Students," *arXiv*, January 2025, https://arxiv.org/abs/2501.02233; Prabal Datta Barua et al., "Artificial Intelligence Enabled Personalised Assistive Tools to Enhance Education of Children with Neurodevelopmental Disorders: A Review," *International Journal of Environmental Research and Public Health* 19, no. 3 (January 2022), https://pmc.ncbi.nlm.nih.gov/articles/PMC8835076/; Nick Haber, Catalin Voss, and Dennis Wall, "Making Emotions Transparent: Google Glass Helps Autistic Kids Understand Facial Expressions through Augmented-Reality Therapy," *IEEE Spectrum* 57, no. 4 (April 2020): 46, https://ieeexplore.ieee.org/document/9055973; Yiwen Xu et al., "Your Voice Is Your Voice: Supporting Self-Expression through Speech Generation and LLMs in Augmented and Alternative Communication," *arXiv*, March 2025, https://arxiv.org/abs/2503.17479.

Incentivize AI for school operations and systems efficiency: AI holds potential to improve the operational side of education: optimizing school bus routes, streamlining enrollment systems, and translating communications for families.[19] These applications, analogous to the digitization of medical records in healthcare, can reduce errors, free up educator time, and indirectly improve learning outcomes. Federal investment can accelerate R&D in these underexplored but high-value areas.

4. Guide Responsible AI Innovation and Adoption in Education

As the federal government advances a national strategy for AI in education, it is critical to align emerging initiatives with long-term, research-based guidance. AI can expand educational opportunity and improve learning outcomes only if it is deployed responsibly, with clear protections for students and educators.

Guidelines for AI adoption in education should prevent harm, protect rights, strengthen human decision-making, and maintain trust. These should:

- *Safeguard student data and privacy* by limiting commercial exploitation, requiring transparency, and mandating interoperability;
- *Ensure fairness and accountability in AI tools* by requiring algorithmic audits and fairness evaluation for all AI tools deployed in schools, with funding streams supporting more representative datasets;
- *Prevent harmful and inappropriate uses*, such as surveillance, manipulation, and automated discipline without human oversight.

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Our recommendations propose a national vision for AI in education that is evidence-based, educator-informed, and grounded in the learning sciences. We also encourage federal efforts on AI education to align with the recommendations the National Academies of Science, Engineering, and Medicine (NASEM) are expected to publish in late 2025.[20] The NASEM report will outline core competencies related to new data and computing developments, including AI,

[19] See Dimitris Bertsimas, Arthur Delarue, and Sebastien Martin, "Optimizing Schools' Start Time and Bus Routes," *Proceedings of the National Academy of Sciences of the United States of America* 116, no. 13 (March 2019): 5943, https://doi.org/10.1073/pnas.1811462116; Leslie Stebbins, "How School Leaders Are Using AI to Revolutionize Operations and Procurement: An EDspaces Guide for School Leaders," EDspaces, May 22, 2025, https://ed-spaces.com/stories/how-school-leaders-are-using-ai-to-revolutionize-operations-and-procurement-an-edspaces-guide-for-school-leaders/.

[20] "Developing Competencies for the Future of Data and Computing: The Role of K-12," National Academies of Sciences, Engineering, and Medicine, accessed August 16, 2025, https://www.nationalacademies.org/our-work/developing-competencies-for-the-future-of-data-and-computing-the-role-of-k-12.

thereby offering a strong foundation for guiding curriculum development to help reduce fragmented add-ons and ensure coherence across educational initiatives in this new AI age. Together, these efforts can help ensure that federal priorities in AI benefit all learners and educators. We welcome the opportunity to contribute Stanford's academic expertise and on-the-ground partnerships to ongoing efforts that ensure effective implementation of AI in education.

Sincerely,

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