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Optimizing AI's Role in K-12 Education

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Takeaways

- America's public school system is in dire straits, and technology—from Zoom to smartphones—gets a lot of the blame.
- Although new technology disrupts educational practices, our schools will not prepare students for an AI-abundant world by shutting it out of the classroom.
- Sustainable use of AI in education depends on reinforcing the human relationships that technology can't replicate. Interpersonal and hands-on skills are also fundamental to education and cannot be simply delegated to AIs.
- AI's capabilities are evolving at breakneck speed, and educational uses are evolving alongside that. Examples include: adaptive learning software, tutoring, writing support, teacher support, and guidance support.

The Current Reality of Technology and Schools

Challenges

High school seniors' math scores are at a 20-year low. Their reading scores are at an all-time low. [1] Twenty-four percent of K-12 students in 2024 were chronically absent—missing at least 10% of the school year—nearly double the pre-pandemic rate. [2] College professors widely report having to reduce assigned reading to accommodate undergraduates who cannot complete books. [3]

There is no one factor causing the decline, but technology has attracted a lot of the blame. As a result, there is a concerted effort to reduce the use of technology in classrooms. The pandemic and transition to video-based instruction from 2020 to 2022 coincided with a 214% surge in absenteeism. [4] Many parents, teachers, and some research also blame the spread of smartphones and social media for students' declining attention spans and

performance. [5] The majority of states now have laws banning or regulating phones in schools. [6]

Trends

Not all trends in technology and education are so negative or simple. The majority of students and teachers today use AI, and the teachers who use it report that it saves almost six hours of work per week. [7] AI adoption among educators and pupils has risen dramatically since ChatGPT's release, outpacing many school districts' ability to issue training and guidance. [8]

Research has long showed that access to a personal tutor increases student performance dramatically, raising the prospect that educational AI like chatbots—if implemented properly and with appropriate age-based safeguards—could unlock unprecedented performance gains in the near future. [9] We should expect this impact to be most dramatic in low-income areas and under-resourced schools, where students are less likely to already have access to human tutors.

Yet the majority of parents and students believe AI harms critical thinking skills. [10] If educational AI is to deliver on its promise, it will have to win the trust of the stakeholders it serves—a question not just for innovators, but school administrators and policymakers.

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Why and How Humans Are Needed

The American Federation of Teachers says, "Technology will never, and should never, replace human interaction; nonetheless, we must adapt and integrate it into our work." [12] Public school teachers, often overstretched and underpaid, are already stepping up to revamp class with AI—often without guidance or training. **Sustainable use of AI in education depends on reinforcing the human relationships that technology can't replicate**.

In *The Last Human Job,* Allison Pugh explores "connective labor": work rooted in human relationships that automation cannot replace. [13] This is a powerful organizing principle to consider both the future of the classroom and what it should achieve. As AI reshapes the

economy, classrooms should prioritize the development of deeply interpersonal capacities machines cannot replicate.

AI cannot replace the benefits of in-person discussion. History and literature, for example, are two subjects where face-to-face discussion and activities are more important than ever. Students can still use AI to understand unfamiliar chapters of history or Shakespeare. Quizzes can help assess memorization. But in an AI-abundant classroom, in-person discussion will be essential for students to demonstrate they have mastered a subject enough to articulate and exchange thoughts about it extemporaneously. [14]

Touching grass is also vital. Fitness, group projects, and science labs will also be essential to give students hands-on, physical, and interpersonal experience. Assuming some amount of classroom instruction will migrate to algorithmically personalized and screen-based coursework, screenless and outdoor activities will give students literal and figurative opportunities to "touch grass." [15] Investing time in these activities can reassure parents who are concerned about rises in screen use and mental illness that their concerns are heard. [16]

Finally, extracurriculars give students motivation and meaning that AI cannot automate. Extracurricular activities like athletics, music, theater, and debate cultivate students' sense of individuality, confidence, and purpose. In an AI-abundant world, students may understandably lose motivation to master skills that can be replicated by an AI due to a phenomenon called "cognitive offloading." [17] Extracurriculars can counter this dynamic by offering opportunities for achievement in domains where effort and skill cannot be automated. They create intrinsic motivation for students to find fulfillment that remains contingent on their performance in routine work—a habit that is more important than any one lesson.

Education is an inherently human endeavor grounded in curiosity and shared work. AI cannot replace humans' role, but it can expand access and tailor material to individual students' needs, skills, and interests, enabling students to achieve more than with traditional instruction. Implemented well, AI can accelerate learning and free students and teachers to focus on judgment and growth, leaving fewer students behind and avoiding holding others back.

Where Tech Works

AI's capabilities are evolving at breakneck speed, and educational uses are evolving alongside that. Despite this flux, several promising use cases have already emerged.

Adaptive Learning Software

Measures of Academic Progress (MAP) scores track K-12 students' progress in math, reading, language usage, and science, and are highly correlated with SAT scores and college attendance. [18] They test the cumulative mastery of content in each subject across grades, granularly quantifying educational progress.

DreamBox is an example of adaptive learning software (which adjusts instruction in real time based on a learner's performance and needs) that has been proven to raise MAP scores in math. DreamBox uses frequent formative assessments and real-time adjustment to personalize math instruction in a gamified format, similar to how Duolingo structures language learning. [19] This personalized approach to math instruction is especially effective for the lowest-performing students, who are able to master challenging subjects at their own pace without being left behind. [20] A Harvard University study from 2014 to 2016 showed that students who used DreamBox 20 minutes per week improved their MAP scores by 2.5 points, while those who used it for 60 minutes per week improved by 7.5 points. [21]

Separately, evidence from one private school—Alpha School—suggests dedicating mornings to fully personalized computer-based instruction can accelerate students' progress on MAP tests by 2.6x. [22] While these results cannot be generalized, they are worth taking seriously.

Tutoring

Khan Academy, another online learning platform, launched its AI tutor Khanmigo in 2023, building upon ChatGPT's large language model with a purpose-made tutoring program designed not to give students answers, but to work through them together. [23] It is too early to assess if Khanmigo delivers anything like the two standard deviation performance improvements attributed to human tutors, but even a fraction of that would represent a step-change in education. [24]

Writing Support

Cheating detection software is still highly unreliable at detecting chatbot use in writing. [25] Khan Academy's solution is Writing Coach, a writing interface powered by Google Gemini that offers useful feedback to students as they complete writing assignments and flags anomalies like pasting text as possible plagiarism. [26] This approach incorporates AI into the writing process as a "co-intelligence," supporting and centering human agency. [27]

Teacher Support

AI doesn't only promise to accelerate students' learning—it augments teachers' labor significantly. Google's Gemini chatbot and NotebookLM are powerful assistants for teachers and administrators in class management and developing course materials from tests to practice homework. [28] Teachers can efficiently generate grades and personalized feedback at scale by uploading students' tests or writing assignments to NotebookLM, taking responsibility to check the AI's work. [29] This frees up time and energy for teachers to focus on the interpersonal work of education: direct instruction and individual student support.

Teacher Training

Many of America's resourceful teachers have already begun adopting AI without waiting for standards or formal guidance. For both early adopters and cautious educators who are reluctant to deviate from established best practices, programs like Microsoft Elevate offer free professional development and credential programs to help teachers incorporate AI into education successfully. [30] The importance of this training cannot be overstated: integrating AI into education will not prepare students to succeed in an AI-abundant world unless it follows a robust pedagogy and understanding of the evolving science of learning. [31]

Full-Scope Operational Support

Rather than leave teachers to experiment with different AIs, Peninsula School District in Washington state runs Amplify GenAI on Amazon Bedrock as a single, district-approved system. [32] Staff use it to draft emails, prepare lesson plans, and handle routine administrative work. The district has also built simple tools that reference labor agreements to help administrators write contract-compliant messages during school closures, keeping costs, security, and decision-making consistently in line with district policy.

Student Guidance & Support

Finally, AI cannot replace guidance counselors, but 17% of schools have no guidance counselor already and the national counselor-to-student ratio is 1-376—well below the recommended 1-250. A chatbot called Sonny by Sonar Mental Health can check in with students while human operators remain on the line, giving students in under-resourced schools a lifeline that is better than nothing. [33] It should be possible for schools to adopt a hybrid approach with a therapeutic chatbot and a guidance counselor supervisor who takes personal responsibility for triaging students' needs and ensuring appropriate relational boundaries.

Conclusion

Policymakers should accept the reality of AI diffusion in the classroom. Rather than resist AI tools as inherently harmful or corrupting, we must be clear-eyed about when it improves efficiency and hard-nosed about how—if poorly implemented—it can degrade quality. Initiatives like the White House Pledge to America's Youth—a coalition of over 60 organizations and companies dedicated to improving K-12 students' AI readiness—are an important first step that both parties can cooperate on. [34]

The classroom is a revealing microcosm of the broader diffusion of AI into the economy. AI is transforming education much faster than most industries, but a fully automated classroom could never address the breadth of interpersonal needs human staff must accommodate. Instead, AI powerfully *augments* human labor in schools, empowering teachers to focus on higher-order issues like students' performance over time.

The future of labor in the classroom and beyond is likely to center on interpersonal work and accountability for outcomes. Sectors like education, health care, and other care work have high demand for human labor that is unlikely to diminish due to AI in the medium-term, at least. [35] As students and teachers navigate the future of AI and labor together, the lessons they learn and practices they adopt will be relevant to everyone else, too.

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