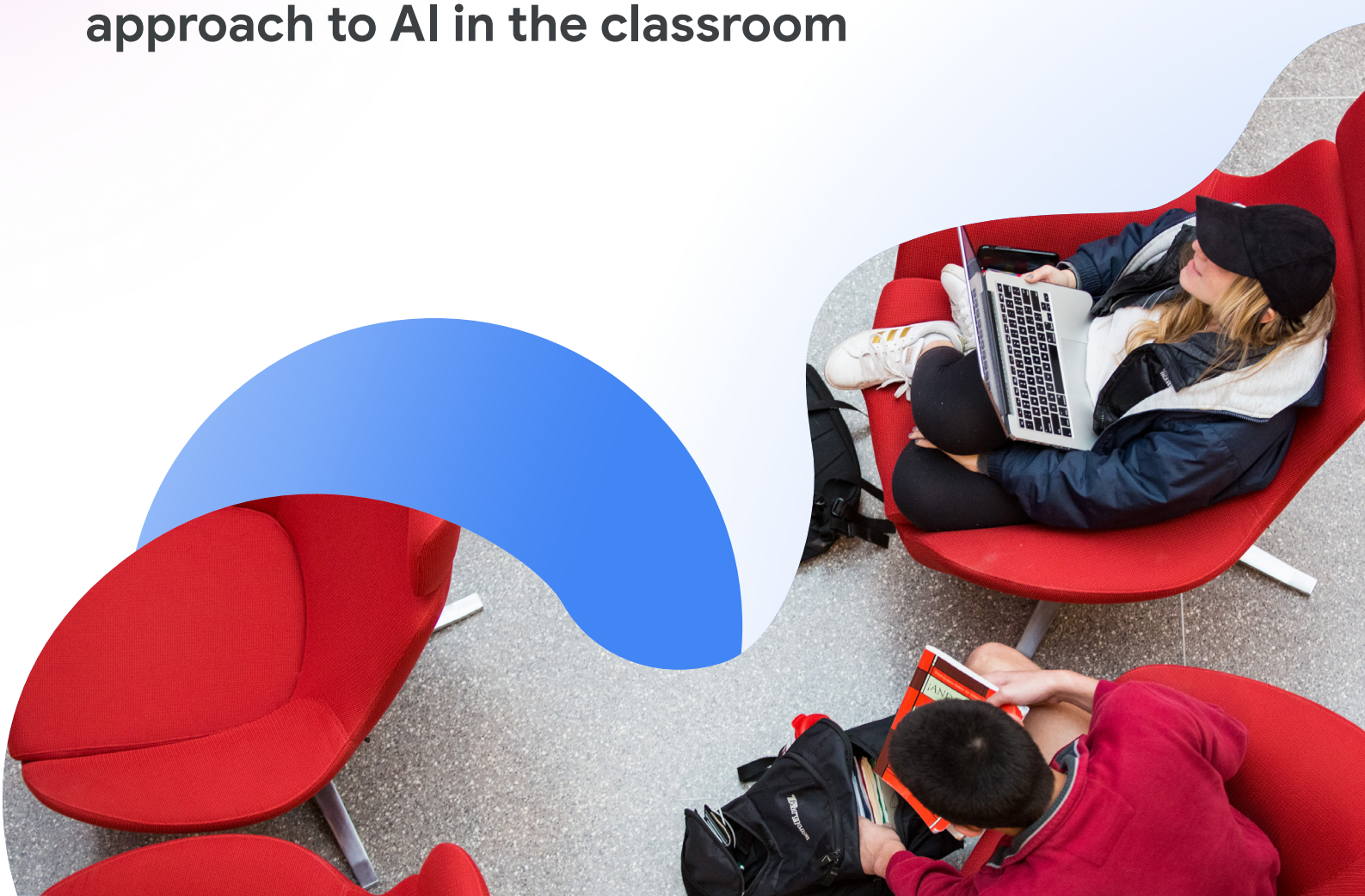
Google Cloud | Google for Education

Faculty and the Machine: Using AI to Advance Student Learning

A pedagogically-informed approach to AI in the classroom



"At DePaul, we're creating an environment where faculty are empowered to explore emerging technologies in ways that align with their academic research and teaching goals," says Robert L. Manuel, President of DePaul University. "By providing access to AI tools and fostering a culture of inquiry, we're supporting faculty innovation and helping students develop the skills they need for a rapidly evolving workplace."

Manuel speaks earnestly of his approach to AI adoption at DePaul. Equipped with the understanding that the trust gap between campus leadership, faculty, and students must first be closed in order to advance AI literacy across every level of the university, he advocates for providing faculty with the information and the support they need to understand how to use AI tools — but to refrain from prescribing when and how the technology is used in the classroom.

"At DePaul, we're creating an environment where faculty are empowered to explore emerging technologies in ways that align with their academic research and teaching goals. By providing access to AI tools and fostering a culture of inquiry, we're supporting faculty innovation and helping students develop the skills they need for a rapidly evolving workplace."

Robert L. Manuel
President
DePaul University

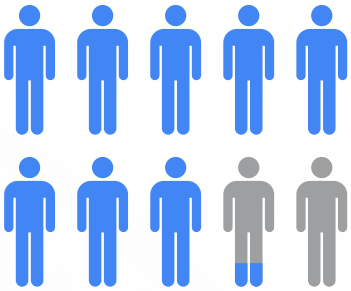
Across higher education, college leaders are grappling with how to encourage more faculty to learn about the foundational functions of AI tools. In a recent survey conducted by the American Association of Colleges and Universities and Elon University, just two (2) percent of higher-ed leaders think that a majority of their faculty are well prepared to use generative AI tools in their teaching.

This poses a challenge for institutions, especially as more of them acknowledge the positive impacts that AI can have on student learning. For example, AI can help students with assignments by identifying calculation errors or explaining complex concepts with personalized explanations and video recommendations.

And while some faculty see the deep personalization or administrative automation that AI can deliver, the majority of faculty across higher-ed institutions maintain the belief that AI is a threat to learning, fearing that college students will "avoid the cycle of effort-failure-success innately built into the act of learning," says one faculty member at a flagship university. Across campuses, college leaders and educators are trying to combat the normalization of cheating (particularly students' sentiments around AI use and what cheating entails), looking into strategies like bringing back proctored exams and revising academic-integrity policies to account for the new ways that students are using AI to support their learning.

82%

of faculty worry that students may become too reliant on AI.



Source: Digital Education Council. "2025 Global AI Faculty Survey." January 2025.

According to the most recent Global AI Faculty Survey from the Digital Education Council, 82 percent of faculty worry that students may become too reliant on AI, weakening their capacities for things like problem solving and critical thinking — a notion that's been referred to as "metacognitive laziness". And concerns around AI as a cheating tool continue to run rampant, with students earning their degrees but lacking the competencies, such as problem solving and critical thinking, that they need to thrive in the workforce.

So what, then, are faculty to make of all this? How can they use AI in their teaching to advance students' AI literacy (as well as their own) without sacrificing what it means to be an independent, thinking human being?

From a pedagogical perspective, higher-ed faculty are increasingly expected to use AI to teach and engage students, whether or not their institutions have official mandates.

Shifting AI From a Cheating Tool to a Pedagogical Partner

The emergence of AI tools and their popularity among students has left a mark on how college educators are teaching students in campus lecture halls, small-group seminars, and face-to-face sessions. According to the 2025 AI Landscape Study from EDUCAUSE, across institutions large and small, two-thirds report using AI as a teaching assistance tool, and more than half report using AI to provide personalized student support.

Across campuses, a growing number of educators are leaning on AI to create differentiated learning plans and to customize assessment criteria — in effect, changing the narrative around these tools. Instead of viewing AI tools strictly as vehicles for student cheating, faculty are finding ways to integrate AI to better engage student learning.

On average,

two-thirds

of educators at small and large institutions are using AI as a teaching assistance tool.

Source: EDUCAUSE. "2025 EDUCAUSE AI Landscape Study: Into the Digital Divide." February 2025.

Shifting AI From a Cheating Tool to a Pedagogical Partner

At the University of Texas at San Antonio, one English professor is teaching students how to combine traditional research skills with AI prompting. Rather than barring AI from the process of learning, it's being used as a tool to improve the quality of their research (and enhance their understanding of the subject). The students, for example, might lean on AI to help them identify scholarly sources or to better organize their information.

Over at Rollins College, in Winter Park, Fla., a computer science professor has adapted coursework for a hybrid environment, splitting offline skills building (such as reading and understanding program code without the aid of technology) from online skills building (applying everything the students learn in person on larger projects outside of class where they can use AI).

The University of Michigan is one of a growing number of institutions working to develop AI literacy across campus.

Jun Li, Professor of Technology and Operations at the University of Michigan's Ross School of Business, piloted an agentic AI Virtual Teaching Assistant developed with Google Public Sector and powered by Gemini. Customizable by educators for specific curricula, the agent provides students with 24/7 support and acts as a practice partner that fosters critical thinking by guiding them to solutions instead of providing direct answers.

Shifting AI From a Cheating Tool to a Pedagogical Partner

"The whole point about learning is that it's a process from a state of unknown to knowing," says Li. "Students have to think through and ask: 'How do I get to the solution?'" For Li, her pedagogical approach to these AI tools is to treat it like a teaching assistant. "I think about what I would tell a real human TA that I hired to help me with courses and how they spend their time in office hours. I'd tell them: 'Your job is to help the student figure out the final answer instead of telling them the final answer.'"

Similar stories are found across several institutions, where faculty and students are engaging with Google AI in ways that support (rather than hinder) student creativity and critical thinking. At the University of California at Riverside, for example, students are using NotebookLM to upload interpretations of readings, write position papers, and even engage in debates within the tool to test their understanding and to find weaknesses in their arguments. At San Diego State University, faculty are using Gemini and NotebookLM to optimize lectures and to engage students with more interactive learning in class.

I think about what I would tell a real human TA that I hired to help me with courses and how they spend their time in office hours. I'd tell them: 'Your job is to help the student figure out the final answer instead of telling them the final answer.'"

Jun Li
Professor of Technology and Operations
University of Michigan's Ross School of Business

Shifting AI From a Cheating Tool to a Pedagogical Partner

"Educators are using Gemini to brainstorm ways that they can incorporate different activities for each specific lesson plan that they're working on and coming up with new approaches in the classroom," says Mary Spence, Senior Program Manager at Google for Education. "Students are leaning on it for guided support. They can use it to get practice materials to hone their knowledge, get feedback on their work, and brainstorm new ideas — all within moments and whenever they need it."

Understanding the necessary role that AI plays in the future of students and recognizing the concerns of faculty, the companies behind these AI tools, like Google, are working more closely with educators to create experiences that both align with key learning science principles and enhance student instruction.

Staying Grounded: Pedagogical Principles in AI

"We've had these aspirational goals for many years," says Drew Sidel, Google's Head of North America for Workspace for Education. "Can we provide access to a teaching assistant for every educator in the world? And can we provide access to a personalized tutor for every student or for every learner — something that is there on demand when they're having trouble understanding a concept or when they just want to learn something new?"

The use cases presented across these different colleges clearly lays out AI's capabilities and its empowerment of both students and faculty. It can facilitate idea exploration, evaluate assignment quality, and accelerate knowledge transfer. But the majority of today's generative-AI systems present information without respect to a human's learning process — a key concern raised incessantly among faculty when evaluating AI's role in the classroom.

Can we provide access to a teaching assistant for every educator in the world? And can we provide access to a personalized tutor for every student or for every learner — something that is there on demand when they're having trouble understanding a concept or when they just want to learn something new?"

Drew Sidel
Head of North America for Workspace for Education
Google

Staying Grounded: Pedagogical Principles in AI

"Today's GenAI models provide incredible potential to democratize access to knowledge and learning, and they're inherently trained to be helpful," says Kaiz Alarakyia, Product Manager for Google DeepMind's AI for Education Research Team. "But, at times, this specific definition of helpfulness is at odds with correct pedagogy and learning." For example, says Kaiz, one key way in which a model's helpfulness conflicts with good learning practices is when it provides a student with a direct answer to a problem rather than guiding a student through the problem.

LearnLM is a family of AI models based on Gemini that's fine-tuned for learning. Created in collaboration with educators, it gives higher-ed faculty opportunities to personalize learning assistance for their students based on pedagogical principles. Through workshops and feedback from pedagogical experts, five core learning-science principles were identified and injected into LearnLM: inspire active learning, manage cognitive load, deepen metacognition, stimulate curiosity, and adapt to a learner's goals and needs.

Today's GenAI models provide incredible potential to democratize access to knowledge and learning, and they're inherently trained to be helpful. But, at times, this specific definition of helpfulness is at odds with correct pedagogy and learning."

Kaiz Alarakyia
Product Manager
Google DeepMind's AI for Education Research Team

Staying Grounded: Pedagogical Principles in AI

"If a model does these behaviors pretty well and encourages these behaviors in students, then we believe that they are more likely to have higher learning outcomes as a result," explains Julia Wilkowski, Pedagogy & Learning Sciences Team Lead at Google. According to her, these pedagogical principles not only drive the development of Google's AI models for education, but also provide a framework against which other models can be evaluated for student-learning outcome effectiveness.

Following these pedagogical principles isn't the only important consideration for educators though. They want to ensure that the information that students are exposed to is, in fact, true.

The FACTS Grounding benchmark was developed to measure the effectiveness of large language models (LLMs): How accurate are a model's responses based on the grounded context that it's provided?

Staying Grounded: Pedagogical Principles in AI

"We wanted to make sure that we could help understand or measure systems in a way that was fair," says Charles Elliott, Head of Industry Architects at Google Public Sector. As he explains it, "FACTS evaluates language models' ability to generate text that is factually accurate with respect to given context in the user prompt."

Elliott uses NotebookLM as an example of a tool designed for strong grounding capabilities. Rather than pulling information from the Internet, NotebookLM only uses information that is provided to the model — specific course material, textbooks, lecture audio recordings, etc. By doing so, the tool prevents the occurrence of hallucinations in its outputs.

Other tools, such as Gems, enables faculty to tailor Gemini to support specific tasks or to interact with certain student groups, while Vertex AI as a whole can enable institutions to build and deploy more complex agents.

A Focus on Assessment: Combating Cognitive Atrophy and Keeping the Human in the Loop

The goal of AI literacy is to move students from passive acceptance to active engagement. Educators want to replace the idea of AI as an infallible "answer box" with the reality that it's a powerful interactive tool to be questioned, directed, and understood.

"Keeping the human in the loop and the idea of metacognitive laziness are really big questions right now," says Elliott. According to him, successful implementation of an AI tool can happen only if faculty remain involved; simply giving access to an AI tool without faculty involvement or guidance can lead to the improper student use that they fear.

"Faculty are right to be concerned," adds Li at Michigan. "Nowadays, students have easy access to AI that can tell them the answer to a homework question right away. In that situation, rather than improving learning, AI is replacing learning."

"Faculty are right to be concerned. Nowadays, students have easy access to AI that can tell them the answer to a homework question right away. In that situation, rather than improving learning, AI is replacing learning."

Jun Li
Professor of Technology and Operations
University of Michigan's Ross School of Business

A Focus on Assessment: Combating Cognitive Atrophy and Keeping the Human in the Loop

This environmental shift towards AI in the classroom is prompting faculty to call for significant changes to student assessments. Fifty-four (54) percent of faculty believe that student assessments should be redesigned, with a call for listing out the essential knowledge and skills that students need to be evaluated on. Instead of focusing assessments on the final product (i.e., what grade a college student receives), the focus should shift towards the process of learning and problem-solving, suggests many of the faculty we've spoken with.

At San Diego State University, this rethinking of student assessments falls in line with the university's attempts at rethinking pedagogy. "The conversation with our faculty is really about starting with their learning outcomes — what do you want your students to achieve?," says James Frazee, Vice President for Information Technology and Chief Information Officer at San Diego State. "We then map out what activities or assignments contribute to each learning outcome, and identify which are vulnerable to an AI tool's impact. How can we redesign this map so that AI is supporting a student towards an outcome rather than holding them back?"

We then map out what activities or assignments contribute to each learning outcome, and identify which are vulnerable to an AI tool's impact. How can we redesign this map so that AI is supporting a student towards an outcome rather than holding them back?"

James Frazee
Vice President for Information Technology and Chief Information Officer
San Diego State

A Focus on Assessment: Combating Cognitive Atrophy and Keeping the Human in the Loop

As Manuel sees it, AI is a catalyst for deeper learning and creative exploration. “At DePaul, our focus is on integrating technology that enhances human connection and critical thinking — preparing students to thrive in an AI-augmented world and address the most pressing challenges facing our society today,” he says.

“Once an institution has defined their student-success outcomes or metrics, you have to evaluate an AI tool’s impact against that,” says Elliott.

Once an institution has defined their student-success outcomes or metrics, you have to evaluate an AI tool’s impact against that.”

Charles Elliott
Head of Industry Architects
Google Public Sector

A Focus on Assessment: Combating Cognitive Atrophy and Keeping the Human in the Loop

Higher ed has to play this dual role: Teach with AI effectively, but also do it in a way that counters this metacognitive laziness.

In order to achieve this, institutions (particularly, the faculty at these colleges) must learn to design curricula and AI-supported tasks that still demand and develop the core human cognitive abilities — such as leadership, critical thinking, and deep analysis — that have traditionally been developed through a college student's academic experience.

Prior to pushing for the implementation of an AI-forward approach in the classroom, higher-ed institutions need to assess where they are currently, what tools they have, and what training is needed (for leadership, faculty, and students) in order to use AI responsibly for student learning.

Feeling overwhelmed? We're here to help.

Higher education is undergoing significant change, with AI playing a critical role in strategic plans for campus efficiency, academic innovation, and scientific discovery. Google is committed to supporting academic institutions of all sizes at every stage of their AI journey.

With more than a decade in AI innovation and 25+ year long heritage in education, only Google brings academia a fully vertically integrated AI stack with planetary-scale.

Recently at Google Cloud Next '25 and Google I/O, we announced, launched, and demoed 300+ things - including that Gemini is the world's leading model for learning - that represent new possibilities for teaching, learning, and research.

Ready to explore the next frontier of AI?

- **Get started with Gemini with trainings, certifications, and learning resources available at no cost.**
- **Sign up for Google AI Essentials and Google Prompt Essentials. Learn foundational AI skills, AI best practices, and how to use AI responsibly. Get more out of AI by discovering how to design more effective prompts, or AI instructions, in 5 easy steps.**
- **Earn a first-of-its-kind generative AI certification for non-technical leaders from Google Cloud. Be the first to equip yourself with the strategic knowledge and validation you need to lead your institution into the AI-powered future. Begin your journey to becoming a Google Cloud Certified Generative AI Leader today.**
- **Try Google Agentspace — A central hub for enterprise-ready AI agents, helping automate campus functions, break down institutional data silos, and build custom agents with one single prompt and no technical expertise required. Unlock the collective brilliance of your Research Centers, IT services, Academic Affairs, faculty, and other key departments in this new era of agent interoperability and enhanced employee productivity.**
- **Reach out to your Google for Education or Google Cloud representative.**