

## Explainer

# Artificial Intelligence and Chatbots in Higher Education

### What is artificial intelligence?

Broadly speaking, artificial intelligence, or AI, encompasses the development and application of computer software and systems that “think” and act like human beings. AI’s applications include speech recognition, visual perception, learning, planning, problem solving, and pattern recognition. In a typical AI application, for example, computers might use algorithms to find patterns in large data sets and generate new knowledge based on that analysis — a process sometimes called “machine learning.”

### What is a chatbot?

A type of software called a “bot” performs automated tasks. A chatbot uses AI to simulate conversation with a user, either with a voice or by text. Prominent examples include virtual assistants like Amazon’s Alexa and Apple’s Siri. Another example might be an automated chat to guide purchasing decisions on a website. Chatbots have become increasingly more sophisticated at adapting their pre-programmed responses to user questions and improving their responsiveness.

### How can AI and chatbots support teaching and learning?

AI and chatbots have the potential to transform certain practices in teaching and learning. AI-related technology, for example, can support hybrid courses that mix face-to-face classroom experiences with student self-directed learning online. AI technology can use data analysis to personalize a student’s learning experience in ways best suited to that learner’s individual needs and learning style. If an undergraduate is having trouble with a concept or lesson, AI-informed software can help tutor her and direct her to supplemental material.

This is one of several ways AI can free up professors to focus on essential tasks. If students can learn the basics outside of the classroom, with the help of artificial-intelligence tools, instructors can use class time to shore up knowledge, connect the lessons to bigger concepts, or focus on collaborative peer learning. In classes, AI applications can also take attendance and perform other administrative functions. Some institutions have begun to use AI to help grade tests and even assess some student work.

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Chatbots are also finding a place in learning. In an online AI course at the Georgia Institute of Technology, for example, a chatbot named “Jill Watson” serves as a teaching assistant to answer routine questions. When Jill was launched in 2016, students did not know she was not human until the last day of class. Researchers at Carnegie Mellon University are creating conversational agents to promote collaborative discussions online among students.

### **How can AI and chatbots support administrative functions?**

Artificial intelligence is also having an impact from admissions to student services. Some colleges are using AI to screen applicants and answer routine questions about enrollment. Georgia State University, for example, is pioneering the use of an admissions chatbot. Named “Pounce,” after the university’s mascot, the chatbot is available 24/7 to answer some 2,000 questions about things like financial aid, registration, and housing in an average of seven seconds. Helping students enroll, Pounce is credited with reducing “summer melt”—when students who have said they plan to attend a college fail to show up—by 21 percent. Because chatbots provide information quickly and effectively, in some contexts more efficiently than human beings, they present opportunities for saving money while improving service.

AI is also driving the use of predictive analytics to identify students who are at risk academically and steer them to advisers for help. Increasingly, too, universities are analyzing data about student success to help students clarify and tailor which academic pathway is best for them and to make good choices about careers.

In another application of AI, Northeastern University and Arizona State University are experimenting with dorm room voice-activated devices that answer student questions about things like dining-hall menus and campus activities.

### **Can AI and chatbots help universities save money?**

With potential applications across university administration — in such functions as human resources, IT, business operations, research, and records management — AI offers ways to improve and streamline many back-office processes. AI chatbots can field routine questions around the clock, improving front-facing customer service while freeing staff for other tasks.

Universities have started to use AI to improve facilities use and maintenance. Smart HVAC and lighting systems linked through the Internet of Things yield volumes of data that can be analyzed across campuses to automate building operations, find operational efficiencies, optimize the use of space, maintain security, and improve facilities maintenance. The University of Texas at Austin, for example, uses AI to manage its landscape sprinklers, saving both water and money. Santa Clara University uses AI to help manage campus parking. The University of Michigan is one of several institutions that are testing the use of driverless campus buses.

### **What concerns do AI and chatbots raise in higher education?**

Adopting AI technology comes with a price tag for hardware, software, facilities, and maintenance that universities must absorb. Institutions must also invest in

training staff: Adopting AI can mean that staff need to come up a fairly steep learning curve, and it may require hiring staff with new skills.

Curricula and programs may need to be altered to reflect the use of AI. Faculty may resent allocation of resources to AI and some may resist “teaching by algorithm.” Critics also raise concerns about whether a reliance on technology could prompt formulaic approaches to learning.

Institutions adopting AI need to ensure that it is not used to supplant human interactions — on either the academic or administrative sides — where AI is not appropriate. AI raises potential ethical issues, especially concerning ownership and use of student data. Experts also urge users to be alert to potential biases built into AI-driven analytic tools built on algorithms and big data, either by using the wrong data or making the wrong kinds of connections in the algorithm itself. A biased predictive-analytics system, for example, could end up making predictions of student success

based on demographic factors like race or income.

### **What can we expect in the future?**

Fundamentally, the promise of AI lies in its ability to bring the power of technology to bear in deepening human thinking and reasoning and accelerating the pace of discovery. Some experts say that AI will enrich the information age in the same way that the industrial revolution improved manufacturing. In the near term, analyzing data through AI will continue to add value to both the quest for student success and the development of more sophisticated business intelligence and better operational practices.

Eventually, AI may do more. Artificial assistants could help design textbooks, deliver course content, develop test questions and evaluate the answers, monitor online discussions, and tutor students. It is also likely that AI will drive new courses and even majors as universities design programs to prepare workers for AI-related work.

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