

AI/MACHINE LEARNING EDUCATION APPLICATIONS

In an *EDUCAUSE Review* article from August 2019, Elana Zeide defined artificial intelligence (AI) as “the attempt to create machines that can do things previously possible only through human cognition.” An *EDUCAUSE Review* article from 2017 penned by Heath Yates and Craig Chamberlain described machine learning (ML) as “teaching machines to learn about something without explicit programming.” While ML is based on the idea that machines are able to learn and adapt through repetitive processes, AI refers to the broader notion that machines can execute tasks intelligently. Both of these overlapping advancements are permeating higher education. We are beginning to see elements of them emerge throughout the enterprise, including in learning management systems (LMSs), student information systems (SISs), office productivity applications, library and admissions services, automatic captioning systems, and mobile products, to name a few. Although AI has not yet achieved self-awareness—that is, the ability to autonomously operate—it is able to support lower-order routine and repetitive cognitive tasks normally handled by humans. Moreover, many of these systems can “learn” over time, increasing and improving their accuracy, speed, and fidelity. AlphaZero, an AI-based program developed by Deepmind, recently **defeated the world’s best chess engine** over the course of 100 matches by teaching itself how to improve. Recent consumer advancements, demonstrated in products such as Google’s new Assistant, illustrate the potential of text-to-speech, deep-learning, and natural language processing—all elements of AI and ML.

Overview

The exemplar projects in this space illustrate an amazing array of developments that are leveraging these emerging technologies. One of the many such technologies that colleges and universities are harnessing is automated chatbot services. Northwestern University and the University of Oklahoma (OU) have developed AI-based chatbots that allow them to extend off-hours student support and recruiting services. **Northwestern’s chatbot** is integrated into its LMS to answer frequent and routine questions often posed by students and faculty. The chatbot was developed using elements of IBM’s Watson Natural Language Processing to leverage decision trees, contextual searches, and issue escalations. Using Google’s custom search engine, the chatbot connects to the LMS knowledge base to provide direct links to the documentation library. It can even generate a helpdesk ticket directly from the chat dialog.

Similarly, the University of Oklahoma’s recently launched **SoonerBot** is primarily used for student recruiting, with plans to expand it into other areas. To date, more than 28,000 student interactions have been logged using SoonerBot, contributing, at least in part, to the largest freshman class in OU’s history in fall 2019. Complementing this effort, OU libraries launched the **Bizzy** chatbot in 2018 to support research services. OU began experimenting with AI by creating an Alexa Skill that could answer common questions about the library during off hours and could search Primo and LibGuides.

AI and ML in Practice

Enhancing Customer Support with AI: Building a Canvas Support Chatbot In-House

Northwestern University harnessed the power of Watson AI services to develop its own customized chatbot to support Canvas. Students and faculty can find answers to common questions using intelligent links to Canvas knowledge bases and even generate a helpdesk ticket directly through the chatbot.

AI Chatbot Pilot Project

Griffith University in Australia developed Sam, an AI chatbot that can be used by students for all manner of questions and support. Using the latest technologies, the system can self-learn the types of search terms commonly used by students. This system is being leveraged across the university to support a variety of student services, including the library, food services, and academic schedules.

Bizzy, the AI Chatbot

Launched in 2017 using Alexa Dots installed in University of Oklahoma residence halls, this technology has grown to include a variety of library services that can be accessed using an AI-based chatbot service. This technology is not only changing the process of search and discovery but is also being leveraged in OU Admissions to recruit students.

At Arizona State University, **Echo Dots** have been deployed in select parts of residence halls to control smart devices and receive course-related information using AI-powered voice assistance. **Utah State University** has also developed AI-powered voice assistance technology that disabled faculty use to control the instructional technology within a learning space.

Designing a more generalized application, Griffith University in Queensland, Australia, developed the **SAM chatbot**, which supports all manner of student life, including library services, residential life questions, and registration and class questions. SAM will soon be embedded throughout the university portal, allowing students to engage with the service on-demand.

Meanwhile, Penn State University is leveraging ML algorithms to predict a student's grade performance—even before courses begin. Using more than 8.5 million records culled from 2005 through 2016, the university developed a model to leverage data from the SIS, including transcript data and information found on admission applications. This predictive algorithm assists university administration in identifying students who might present with higher-than-average academic risks, allowing intervention strategies to be developed in advance. In another ambitious project, the Online Computer Library Center (OCLC), in coordination with seventy librarians and specialists from various organizations, developed **Responsible Operations**, a product that leverages ML and AI to track and chart engagement with various library services. Responsible Operations explores patronage engagement along seven domains, including workforce development and data science services.

To track the growing database of AI projects, OU has developed the **Projects in Artificial Intelligence Registry (PAIR)**, which supports cross-institutional collaboration and locates and tracks grants in the field of AI. PAIR serves as a global directory of active and archival AI projects and research and might eventually serve as a hub for various initiatives.

Many of these emergent projects realize a significant return on their initial investment. For example, although developing a chatbot can involve a significant time and resource investment that requires specialized development, that investment might yield returns in the form of extended hours and operation of the university to meet the needs of a 24/7/365 audience. Similarly, ML applications might allow the university to surface important data regarding student success metrics.

Student Perceptions of Feedback in Large Courses

Penn State University is using machine learning to cultivate student records from its Student Information System. Using these data, Penn State has developed a predictive algorithm that helps advisors determine how well an advisee might perform in an upcoming term.

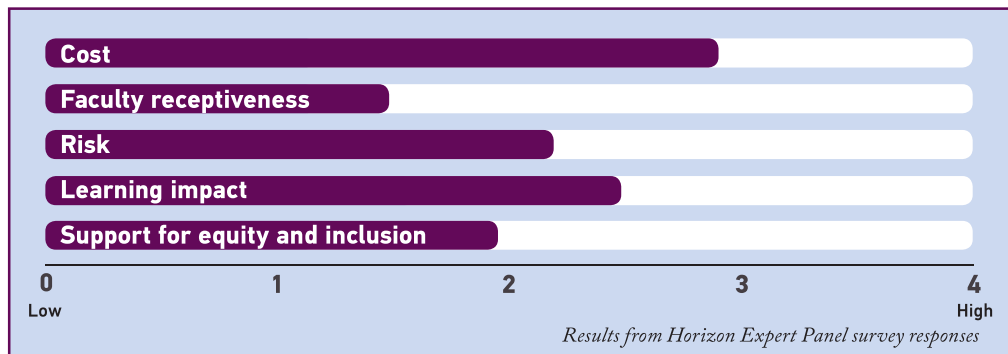
Using Artificial Intelligence to Produce Captions

Texas State University has developed a process for automatically captioning and creating transcripts for videos using artificial intelligence. This service leverages text-to-speech cloud-based technology such as Watson, Azure, and AWS. The result is a service that costs a fraction of human-based systems and, in some cases, is approaching the same accuracy.

Responsible Operations: Data Science, Machine Learning, and AI in Libraries

OCLC worked with an advisory group and more than 70 librarians and other professionals to create a research agenda for libraries to engage with data science, machine learning, and artificial intelligence. The result, Responsible Operations, provides a roadmap for addressing technical, organizational, and social challenges facing the adoption of these technologies.

Dimensions of Adoption:
AI (Artificial Intelligence)/
Machine Learning Ed
Applications



Relevance for Teaching and Learning

These systems are an important technology solution for many institutions. Elements of AI are now embedded into commercial products such as test generators, plagiarism-detection systems, accessibility products, and even common word processors and presentation products. LMSs now include AI technologies that identify and flag students who are potentially at academic risk. Emergent courseware products include algorithms that measure student performance metrics and generate customized, adaptive learning pathways so that each student receives an instructional experience tailored to their needs. To improve test validity, AI systems can now be used to detect unorthodox or suspicious test behaviors among students and flag them for follow-up.

Implementing these technologies in higher education is not without debate, however. Systems that harness student data and make intelligent intervention decisions based on performance metrics are being closely monitored. So-called “nudge” products and guided learning pathway applications that provide individualized learning interventions **have come under scrutiny** in some circles. The delicate balance between these emergent technologies, privacy, ethics, and access to student data remains a contested topic. And given that many systems are now cloud-based, this raises the specter of potential data misuse.

Further Reading

New York Times
The Machines Are Learning, and So Are the Students

The University of Oklahoma
OU Uses Artificial Intelligence in Recruitment

Utah State University
Blind Instructor Now Uses Amazon Alexa to Manage Her Classroom