ARTIFICIAL INTELLIGENCE
IN HIGHER EDUCATION

Current Uses and Future Applications

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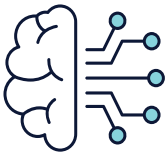
EXECUTIVE SUMMARY

Artificial intelligence (AI) is becoming more attainable in every sector of the economy, and higher education is no exception. AI opens up the possibility for higher education services to become scalable at an unprecedented rate, both inside and outside the classroom. This report explores some of the immediate and future applications of AI in higher education, as well as some of the challenges to implementing them.

We surveyed how AI is currently impacting four key areas in higher education and the opportunities for growth in the near and distant future.

- **Student acquisition:** AI can provide 24/7 personalized assistance to students moving through the enrollment process. In the future, AI could help schools target recruitment to students who are likely to succeed at their institution and in certain majors, leading to higher enrollment and retention rates.



- **Learning and instruction:** AI can help instructors grade and supply struggling students with the resources they need to succeed. In the future, this could free up faculty members to oversee large classes while still engaging with students on a deeper level.

- **Student affairs:** AI can deliver personalized degree planning and intervene with struggling students. In the future, AI could anticipate students' academic needs based on predictive data and past performance, and then proactively supply appropriate resources, such as additional tutoring or advising.

- **Institutional efficiency:** AI can pull together information from multiple campus systems and use the data to guide administrative decisions such as course offerings. In the future, AI could help institutions understand local employers' hiring needs and create curricula that prepares students to fill them.

Although the possibilities of AI are quite exciting, a number of challenges exist to seeing new programs flourish on college campuses. For example:

- Accreditation and financial aid requirements should be updated to address the re-imagination of academic achievement and instructional support provided by AI.
- Privacy regulations such as FERPA need to be updated in order to address the ability of AI systems to track data and use it for predictive analytics.
- If AI takes over some current job responsibilities such as grading and answering students' questions, administrators and faculty members will be able to shift their focus to solving more complex problems and connecting with students on deeper levels. Administrative staff should accommodate this shift as much as possible.

To meet the opportunities and challenges presented by AI entering the higher education sector, we encourage institutions to examine (a) when to implement AI (short- or long-term), (b) in what areas of the institution AI would be most helpful, (c) how to protect students' privacy while using data to help them, and (d) what the university's definition of success is regarding AI implementation. AI can open up vast new possibilities for higher education, and institutions that take the time to integrate it well will enjoy the benefits it brings to students, instructors, and administrators alike.

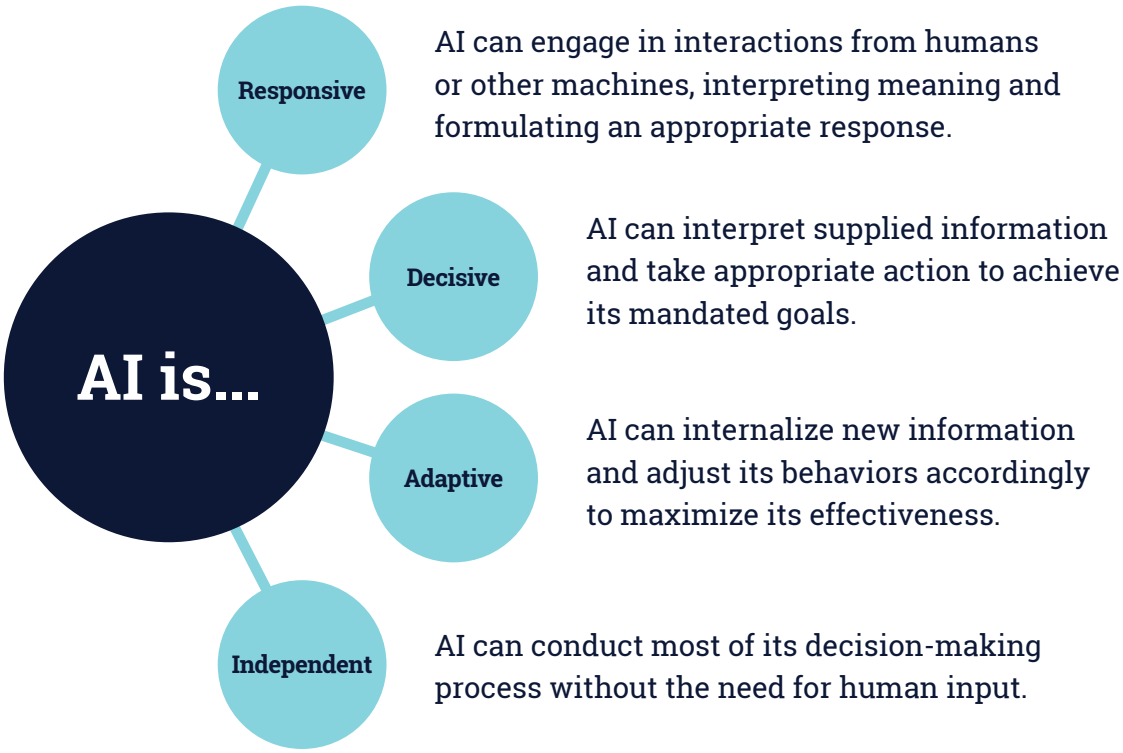
INTRODUCTION

> **"We can only see a short distance ahead, but we can see plenty there that needs to be done."**
>
> ***— Alan Turing***[1]

It's no secret that higher education is labor-intensive. Instructional faculty salaries alone account (on average) for between one-quarter and one-third of most U.S. institutions' budgets each year (based on most recent IPEDS reporting).[2] Factor in the labor of admissions and retention staff and supporting administrative personnel and one begins to develop a high appreciation for the amount of effort that institutions put into the learning and success of all their students, both online and traditional. It's even less of a secret that this effort generates vast amounts of data and that a large amount of effort is expended on repetitive tasks to collect and act upon it.

As artificial intelligence (AI) becomes more effective and machine learning becomes increasingly capable of internalizing complex concerns, we approach an age where faculty and staff can be relieved of many labor-intensive, but ultimately rote, tasks. Innovators in the marketplace are already beginning to tackle that challenge, and while we are a long way off from a higher education world out of science fiction, AI solutions exist in the market that free up brainpower and time, allowing us to pursue a rigorous, adaptive and personalized experience for students.

There is a rush across a variety of markets to implement AI solutions within organizations, the key goal and focus being scale. Tasks that no longer require human labor become cheaper, more efficient, and generate a better value to the consumer through lower costs or more output for existing costs. Before discussing how AI is affecting higher education and its future role on campuses, in the job market and beyond, we should operate with a working definition of what it is and what features it may entail. Since there is no universal definition, we suggest that artificial intelligence possess at least some, if not all, of the characteristics on the following page:



In this brief, we conducted a survey of the current landscape of artificial intelligence applications within higher education and reported on how AI is influencing academe in four key areas: student acquisition, learning and instruction, student retention and overall efficiency of effort. This is far from an exhaustive review: There are many more examples of how AI is impacting our world and higher education, but we hope to show the beginnings of what we think will become new norms and how they will improve the lives of faculty, staff and students.

We believe that AI will have a positive influence on higher education, improving outcomes and helping institutions scale quality education for their students. This will hopefully lead to a cheaper, more responsive approach to our industry. For higher education to take full advantage of AI, there are a variety of regulatory, societal and organizational concerns that must first be addressed. Not only will the institution as a concept need to change, but so will how we as society view its contribution to the workforce. While there remain practical and ethical challenges to be resolved in this space, the potential of AI warrants the requisite effort to address them.

Imagine a world where grading a full course's papers takes 15 minutes, and teaching assistants, student advisors and enrollment counselors are available 24 hours a day, seven days a week. This is a world where a student's degree plan can shift instantly based on his or her needs, updated with a clear breakdown of how those shifts will affect costs, and quickly relayed to his or her advisor. Imagine a world where faculty can create immersive, real-world experiences for students without leaving the classroom, map out a class's misconceptions about material down to discrete learning outcomes and select a series of intervention strategies targeted to each student's unique learning needs.

Many of these elements have always been possible through extensive human effort, but AI will make this world available at scale, freeing up faculty and staff to deliver a more personal, tailored experience that better meets students' needs and prepares them for success.

STUDENT ACQUISITION

Attracting students to a college or university has become increasingly difficult given the current overall trend in declining enrollments in higher education. The 2016 version of The Learning House, Inc.'s annual survey of past, present and prospective online college students, done in concert with Aslanian Market Research, notes that 41 percent of potential students use .edu websites as the primary source for their decisions.[3] This means the institution's website is its No. 1 marketing tool for housing all information a prospective student needs and may be the first place a student interacts with the institution. As such, the institution must be responsive and authentic in its communications as prospective students begin to consider enrolling.

AI presence on these sites needs to guide students to information quickly, accurately and in a tone that is consistent with the institution.

Colleges and universities have turned to chatbots to help answer frequently asked questions (FAQs) from students. Looking forward, AI may also be deployed to reach prospects via other mediums and schedule future calls with live enrollment counselors. This can help counselors focus more on student conversion than the task of providing answers to basic questions.

Applications in the Field

- **FAQ Chatbot that Scales an Enrollment Team:** The enrollment process at any institution is a series of steps that are required from both the institution itself and the federal government. Prospective students often must navigate these steps with little help. Reaching out to an institution with a question can sometimes slow down or even derail the process if a college is too slow to respond. On the institutional side, answering these questions daily is time-consuming and pulls counselors from the task of nurturing students who are further along in the enrollment process. Companies like AdmitHub are developing chatbots that prospective students can text for answers to thousands of common questions. This frees counselors to handle higher priority tasks.

- **Scheduling Appointments with Prospective Students:** Chatbots function 24/7, even when

Case Study: Georgia State University and Pounce

Georgia State University partnered with AdmitHub to create a database of frequent questions answered by their admissions office.[4] The university struggled with summer melt; they were losing prospective students who could not navigate the admissions process, and they did not have manpower to support every student through the process. AdmitHub created Pounce, a custom personal assistant for students enrolling at GSU. This program answers questions, "nudges" prospective students to complete tasks, and helps them successfully enroll at the institution.

Of the 50,000+ questions asked during a five-month period, over 99 percent were answered by Pounce.[5] Enrollment grew 3.9 percent and summer melt decreased 21.4 percent when the program was used.[6] Eighty-percent of students gave Pounce a four- or five-star rating, further showing the success of the AI.

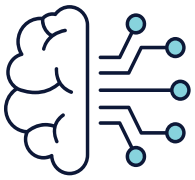
humans are not available to respond to an inquiry. With student questions coming at all hours of the day, and limitations placed on staff, it is not uncommon for calls to be missed and inquiry responses to take days. Google has developed Google Duplex, an AI that makes outgoing calls in a realistic human voice to perform low-level tasks such as scheduling a hair appointment or restaurant reservation. There is potential for a similar program to be used as a first-level response to prospective students that complete a contact form online or call an enrollment center. AI could schedule a live counselor to call that student and provide notes as to the nature of the conversation. Again, this can make the enrollment team more efficient and allow a small number of counselors to respond to more students in less time.

Near Term Innovation: The Further Integration of AI for Student Recruitment

Currently, higher education has not integrated AI in their student recruitment efforts beyond chatbot services. However, one can imagine that not far into the future, additional education technology companies will develop (or more AI platforms used in product marketing will be coopted) for use in student recruitment. There are forms of AI currently that plug into customer databases and "learn" what the ideal customer is that has purchased a product. How this person behaves during the buying process,

what marketing ads they respond best to, and the persons purchase cycle all can be diagnosed by AI programs. This AI then can find individuals that match these traits and show them ads for the product. These ads can also be changed in “real time” by the AI if they find certain ads are preforming better than others. Such AI increased sales of Harley Davidson motorcycles in the New York City market. This same technology could be adopted by higher education for student recruitment in the next five years as pressure to fill class rosters increases and tuition-dependent colleges continue to struggle.

LEARNING ENHANCEMENT



Learning and instruction continue to evolve with technology innovations for teachers. AI-enhanced content creates more engaging, rigorous and adaptive approaches to the classroom experience. From lesson material that identifies and corrects student misconceptions to grader-bots that can maintain the community within an online course's discussion board, AI is beginning to improve the learning experience.

There is no substitute for engaged, competent – and human – teachers who are experts in their field. The idea of a fully AI-facilitated class is distant if it is feasible at all. However, modern faculty have a range of AI tools available that can address maintenance tasks and other routine work associated with teaching while allowing more time for faculty to foster meaningful relationships with students, scaling a personalized approach to a larger classroom.

Applications in the Field

- **Adaptive Courseware:** At its most direct, AI can be integrated into courseware as a direct instructional tool, either to help students practice and guide them through learning activities or to help students walk through more realistic simulations and applications. Some AI applications are targeted and content-specific, such as ShadowHealth, a program that simulates patient cases for nursing students who would normally have to schedule time with live actors (a common practice in medicine) to practice skills they need for patients. Others, like the program E-Coach that is in development at the University of Michigan, are more adaptable and focus on formative feedback for a variety of subjects in the STEM fields. E-Coach tracks students in large classes as they progress through lessons, guides them away from common mistakes and identifies potential areas of interest. It can also point students toward relevant practice activities for their course based on their performance in previous modules.[7]

- **Assessment Tools:** One time-consuming aspect of teaching is assessing student work and providing feedback. A wide range of tools in this area are in development for faculty and institutions, including M-Write, again incubated

Case Study: The Future of Engagement

One of the hardest things to do in education is measure learner engagement, either during instruction or while they're interacting with learning materials. It remains one of the areas of instruction that is more art than science and, as a class size expands, that art becomes more difficult – until now.

The University of St. Thomas in Minnesota, in partnership with Microsoft, is piloting use of facial recognition software to measure engagement of individuals within the classroom. The system uses AI to monitor faces in the room and identify visible emotional "tells" known to be associated with engagement.[13] It can produce a report for the professor in real-time regarding overall engagement and identify the moment when students lose focus or become less interested in a topic. This will give professors the opportunity to adjust teaching to reengage students.

by the University of Michigan. M-Write is designed to help faculty tackle writing activities in introductory level courses at scale. It uses an algorithm to identify areas of a writing piece in which students are struggling, and the underlying issues contributing to weaker writing.[8] For complicated STEM assignments such as proofs or short responses in exams, the program Gradescope sifts and groups similar responses together, allowing the professor to grade the whole group as one and transfer feedback to all students who offered similar answers. It also tracks overall classroom performance and provides a dashboard for faculty to review.[9] Peerceptiv, another automated grading and insights platform, includes double-blind peer review structures that, coupled with algorithms generated at the University of Pittsburgh, can grade complex, long-form essays and projects within a reasonable degree of a professor's evaluative opinion.[10]

- **Presence Magnifiers:** Faculty who teach large classes, either online or on-ground, often face the challenge of delivering a personalized community for their students. Traditionally, this has been handled by either shrinking class sizes or dividing classes into sections and assigning TAs to monitor routine aspects of the course. In 2016, Georgia Tech piloted a new AI-driven TA, Jill Watson, to help facilitate a high-enrollment course. Watson served as a chatbot for administrative issues and fielded complex questions about assignments in discussion

Case Study continued

While the resource has yet to be rolled out completely to students, it is being soft piloted in specific meetings with faculty and staff around campus. A proposal was sent to UST's Institutional Review Board to test software with a live classroom during the spring semester of 2018. Further reports have yet to be disclosed.

boards. Watson is currently in testing within the institution before a scalable version becomes available in the marketplace.[11] Packback has gone to market with an AI application that monitors discussion boards for student engagement, helps students ask open-ended questions and tracks their curiosity.[12]

Looking Forward: Near Term Innovation in Instruction

While current AI developments for instructional support are emerging, it is easy to see how their short-term trajectory could empower faculty in the classroom. As assessment aggregation AI proliferates, faculty teaching loads and administrative responsibilities may begin to stabilize, and faculty will have more time available to interact with students on an individual basis. This will likely lead to increased standardization of curriculum, requiring more departmental collaboration as AI elements require more unified approaches to how materials are taught to scale.

In addition, as AI blends with facial recognition, faculty may have real-time access to tools that objectively measure student engagement and help faculty identify and redirect disengaged students. The Minerva Schools' Active Learning Forum (ALF) is currently making strides by measuring time students spend talking in synchronous sessions and comparing to the average, allowing faculty to bring students showing less participation into the fold.[14] AI, if coupled with facial interpretation software piloted at the University of Saint Thomas, could give faculty a powerful new means of sourcing and acting on objective feedback from their classrooms.

STUDENT AFFAIRS

Advising and retention services have traditionally been a reactive profession – faculty identify students in need of help and flag them for an advisor, or students seek advisors on their own. This setup has changed drastically over the past decade with advances in student data and analytics; student affairs actors are now able to proactively identify students in need and intervene directly. Whether on campus or online, AI has emerged as a force multiplier, helping small support departments scale and do the work that used to take entire teams.

A responsive institution can use AI to deliver personalized degree plans, build a more connected community and give registrars and academic departments more accurate predictions of course offering needs. AI can handle rote work and free student affairs professionals to engage in more personal and complex activities.

Applications in the Field

Student affairs is a broad field incorporating a variety of skill sets and support systems for both online and on-campus students. Given the diversity of needs, there are no one-size-fits-all solutions. However, many of the applications listed below allow scalability of customization, triaging between common problems and personal issues that require individual attention.

- **Adaptive Degree Planning and Student Monitoring:** One of the biggest hurdles students face every semester is understanding what courses need to be taken to graduate, how sequencing prerequisite courses affects eligibility for future courses in the pipeline, and how this timeline impacts their career goals. One new AI application, Stellic, is attempting to resolve this issue. Stellic allows students to create degree plans based on career templates of former students, project the effects of plan changes on their graduation rate and communicate changes to academic advisors. It can also flag at-risk students and maintain a real-time student profile. While still in incubation, its first contract with Elon University is considered a success.[15]

- **Tutoring and Remediation:** While many institutions invest funds and personnel into student remediation, they often struggle to provide approaches for students that target their individual needs. This is a logical by-product of serving multiple departments with a small staff. Tutoring and academic support

Case Study: Dallas County Community Colleges and Scalable Accessibility

Access to materials is one barrier to asynchronous education. The Americans with Disabilities Act requires that learning content be presented in a manner accessible to persons with disabilities, or that appropriate accommodations are made when this isn't possible. Institutions are regularly subject to accessibility complaints and lawsuits.[18]

Videos, especially self-made videos by faculty, can pose a significant risk from an accessibility perspective. Students with visual or auditory impairments may struggle to access content in a meaningful way. To meet web content accessibility guidelines, captions are often required.[19] Captioning a video is labor intensive, so institutions must

are often split between a tutoring center and faculty office hours or remedial courses. Mika, developed by Carnegie Learning, attempts a more personalized approach. Mika is a platform that provides personalized feedback for students as they work through math problems, then categorizes their needs into specific skill sets. This helps tutors and faculty diagnose issues and provide tailored intervention for the student should Mika's attempts prove insufficient. While currently available for math tutoring, Mika could easily be adapted to other subject areas over time.[16]

- **Virtual Assistants for Students:** Perhaps the highest-profile application of AI in higher education comes from implementing virtual assistants (Alexa, Siri, Cortana) within an institution. Saint Louis University distributed a fleet of Amazon Alexa Dots throughout campus buildings, including all student dorms, to make it easy for students to access information (library hours, on campus activities, etc.). In addition to offering campus information, Ask SLU (the Alexa skill) is being developed to tackle more personalized needs, though the extent to which the skill will be built out has yet to be revealed. Other institutions such as Northeastern University and Arizona State University are experimenting with Alexa on campus, though on a smaller scale.[17]

Case Study continued

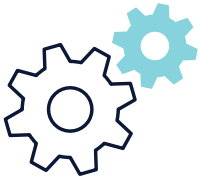
decide whether to expend the resources to make a video accessible, remove the video or provide alternative materials. Most institutions expect these decisions to be made at the faculty level and then face the risk of inaccessible videos being published on their websites.

The Dallas County Community College system found a scalable solution. By processing videos through an application of IBM's Watson AI, automatically generated captions align with spoken words within videos. Videos are published for faculty to review and to upload to their online courses. This can be done quickly and without relying on human transcriptionists. Faculty members use highly processed video as a content delivery tool and can also record short updates and introductory videos tailored to students in their classes, creating a personalized experience for all students.[20]

Near Term Innovation in Student Affairs

Student affairs is one of the most difficult jobs on campus as it requires immense human labor. This is in part due to its complexity, which AI may be able to address at scale. With advising programs like Stellic to navigate degree planning and monitor progress for students, advisors can shift from acute and emergent intervention to long-term preventative advising, and address trends well before students become at-risk. Additionally, this data can be regularly shared with faculty and used to target courses and sections of programs with consistent issues for students and recommend adjustments in instructional design, support, tutoring and expectations.

INSTITUTIONAL MAXIMIZATION



Technology and IT systems on campuses across the country continue to grow in both scale and complexity, and as a result, the amount of data collected on college campuses has increased exponentially over the last decade. The problem is that data are housed in multiple systems, often controlled by different parts of the campus, and cannot communicate or be harnessed in a meaningful way. For example, as institutions investigate how to help students succeed, they access student grades in one system, library visits in a second and interactions with the learning management system (LMS) in a third. Even if they can access data in those systems, data may not be easily exported or evaluated in a way that draws true conclusions. AI can help create a more connected campus by allowing institutions to draw on multiple data systems, guiding improvements for both students and administrators.

Applications in the Field

- **Planning for Future Course Offerings:** Knowing what courses need to be offered and when can be a complex process, and student retention can be impacted. Students drop out while waiting for a certain course in their major to be offered. At a macro level, planning budgets for programs can miss the mark if this data is left out. As previously noted, Stellic is an AI application that helps with student degree planning. However, the application can also be used by administrators to better understand which courses to offer in the future, when to offer certain courses and how many sections may be needed to meet student demand. This can help with retention, as students will not have to wait for a key course to be offered to complete their degree, and administrators can budget accordingly for course development and staffing.

- **The Ability to Create Hyper-Learning Opportunities:** Student success tools can increase effectiveness if they tap into different parts of the campus. As diverse student and administrative systems can be tied together, "hyper-learning" can begin to occur. This is a process in which institutions can use data to make complex decisions. For example, if building maintenance requests could be linked to class schedules, window repair could be scheduled to avoid peak building usage. If student support service usage could be tied to course calendars, times could be noted as to which courses may require additional tutors or

Case Study: Deakin University (Australia)

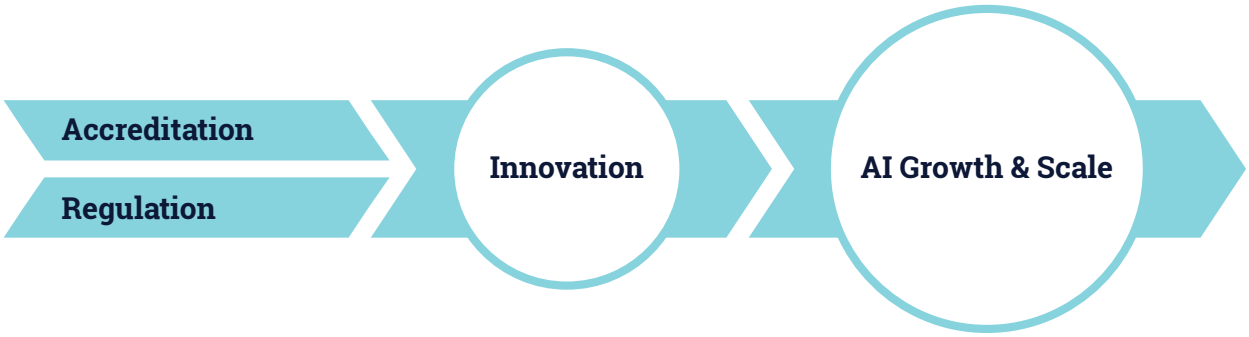
Deakin University in Australia developed a proactive agent that accesses multiple databases, answers students' questions and coaches them throughout their program.[21] The system knows when students have accessed course materials and the library, as well as tracks their location to see if they have been studying in one place for too long. The system, known as Genie, learns as it answers more student inquiries. This AI takes the idea of a chatbot further, as it relies on a database of programmed answers and accesses multiple campus databases that are growing daily as data points are added.

writing center staff on hand. The more data is tied together, the easier it is to draw concrete conclusions and make necessary improvements.

THE FUTURE STATE OF AI

Artificial intelligence in higher education is still in preliminary stages of adoption. The Higher Education Act (HEA) has not yet been reauthorized and may not until after the next presidential election. As noted, FERPA's current iteration dates back to 2001. Until legislation is updated to directly comment on parameters placed around AI, it is difficult to say what can or will happen as we look 20 to 40 years ahead.

With regulation guidance slow to address AI and the current rules of accreditation, AI's growth and scale in higher education could be stifled compared to other sectors of the U.S. economy. With higher education currently providing the skilled workforce for much of the U.S. economy, this stifled growth could lead to industries taking a DIY approach to training their workforce if they feel higher education cannot keep pace with their needs.



Below, we will discuss some of the possibilities of how adoption may progress based on how current versions of AI have been adopted within and outside of higher education. This vision assumes both the HEOA and FERPA will be open to the growth and application of AI.

Student Acquisition

Colleges and universities of the future will rely on AI for optimal student acquisition. Institutions will be able to narrowly define the "ideal" student and use AI to select the best candidates. This is due to growth of marketing automation and predictive analytics to help with prospective student targeting and segmentation. Prospective students will receive customized marketing pieces discussing why the institution is best for them. These pieces may even cite predictive analytics measures used to make a case for a student to enroll with that institution.

Currently, the practice of college selection begins in secondary school. Predictive analytics in education may speed the process to start earlier, with students identifying a future college major and career path as early as elementary school. State testing can feed an AI system the necessary data to target students in need of intervention quickly and provide intervention services via AI, then identify students who are likely to succeed at certain colleges and universities. These institutions can start their recruitment process much sooner.

How students pay for their education will also change. AI can – and will — allow for the cost of education to be maintained, if not reduced (if true scale is allowed). Equally, students will be less likely to switch majors and take courses that are not needed for their major, which will also help reduce cost. Institutions will likely have a stronger focus on student outcomes, either by design or through a shift in regulation to focus more on factors like job placements and return-on-investment. Through a focus on outcomes, there will be a rise in programs like income-sharing agreements, deferred tuition and employer-funded degrees. Employers will see value in developing a pool of students with the skills they need, so they will be more likely to establish relationships to hire, if not sponsor, future employees.

Learning Enhancement & Student Affairs

With the use of AI in the classroom, students who are struggling can be identified sooner and prescribed custom interventions that are adaptive to their situations. Human interaction, whether with a professor or tutor, will be targeted and occur at the most beneficial times of the course, with AI handling routine tasks, such as grading and assessment.

The idea of "star faculty" can become a reality due to presence magnification. For example, someone like Sal Kahn could teach algebra to a university's entire freshman class. He could focus on instruction while AI fields questions, provides intervention and grades assessments. As "early warning systems" are built into existing student success systems, these will evolve to identify struggling students and intervene without human deployment.

Instruction delivery can evolve as well, with adaptive learning math labs being a relevant current example. In 20 years, the didactic aspects of math, computer science or even history could be delivered via AI applications that engage with students, identify who is learning and how they are learning, and adjust the delivery method so that all students can master content. As this occurs, faculty can monitor student progress and intervene directly to address misconceptions as well as engage in richer conversations around student research, internships, life goals and how these factors align with course material.

Students' grades can then feed into the student-degree-pathing AI and plot their sequence of courses for next term. This builds on Stellic's degree mapping technology, but one can also see how this pathing, when provided with more student learning data from the classroom, could not only recommend which course to take, but also suggest the most effective method of course delivery. For example, if the student is having difficulty with math and their next course is a statistics course, the AI could prescribe additional tutoring help to support this student or flag the concern for faculty who can schedule 1-on-1 time.

In general, faculty-student relationships will become the cornerstone of the learning experience as didactic instruction becomes automated. Human interaction is a critical aspect of instruction and AI will provide the means for rich individual interactions between learners and professors to occur at an unprecedented frequency and scale.

Institutional Maximization

The efficiency gained using AI at scale can drastically reduce the price of college in the U.S. The large teams of staff needed to run enrollment call centers and staff student services, as well as large cadres of faculty will be hallmarks of the past. Job disruptions will occur, but not all these jobs will be lost to AI. Just as social media marketer was not an occupation 10 years ago, it is likely that new occupations will be born out of AI adoption. Universities and companies alike will need teams of data scientists to analyze collected data and ensure quality and accuracy. AI designers and programmers will be in demand, as well as individuals to maintain the physical space where these computers are housed. It is unlikely that traditional student experiences, such as athletics and clubs, will disappear for the segment of students that continue to seek them out.

With students following a tightly prescribed path for their education, the college catalog may also become streamlined, with fewer comprehensive institutions across the country and more that are focused on offering degrees to fill a specific need in their own region.

Employers in the region will also play a role in identifying the skills and training that the degree programs embody. Consider for example the "nanodegrees" offered by Udacity – programs that Facebook and Google help design. One can see how colleges and employers working together are able to design curriculum to help fulfill local employers' needs. This is already beginning to occur at a regional level; Subaru is developing partnerships with community colleges in Oregon to upskill technicians and mechanics for its dealerships. If employer systems are integrated with local higher education providers, AI can identify a skill need with an employer and adjust the curriculum at the university to help address it.

MAKING THE FUTURE HAPPEN

> **"AI will be the best or worst thing ever for humanity, so let's get it right."**
>
> ***— Elon Musk***[22]

It's easy to get excited about AI and see future benefits, whether in higher education or society. That said, there is much that needs to be addressed to create a viable environment for AI to flourish, prepare institutions for its coming integration and develop a regulatory and ethical framework to govern proper use. We also need a new consensus, not just on how higher education should operate, but also on how it supports other facets of our society, such as the job market and its overall contribution to culture.

Below, we outline a series of actions that need to be taken to make this a reality. Depending on how much progress is made, we believe higher education will ultimately arrive at one of three states.

1. The **Future State**, as described in the previous section, is our interpretation of an ideal given the potential of AI and requires progress to be made across the board on the below issues. AI reaches a point where it seamlessly integrates into higher education and links it more relevantly to other sectors of society (the job market, industry research, etc.). Faculty time is spent in research and developing individual relationships with students as they engage with learning and AI supports all aspects of the student lifecycle, improving retention, acquisition and learning.

2. The **Ad Hoc State** is less optimistic but more likely. Changes outlined in the Future State will occur in a hodge-podge manner on individual campuses in singular areas, but full-scale deployment of any one solution by the industry will be reserved for the least difficult or controversial applications and even then, change will be incremental. This will occur if industry, government, accreditors and leaders in higher education take disorganized action to build a consensus around how to address the concerns outlined below.

3. The **Static State** presumes little to no action taken on our suggested recommendations for consideration below. In this world, higher education institutions maintain course, held in place by institutional, cultural and regulatory inertia. Few if any AI applications are

deployed within institutions, as the cost of implementation remains prohibitive to all but the wealthiest and most prestigious universities. Programmatic adjustments to meet the coming revolution in the job market are stymied by barriers to innovation. In a Static State, employers continue to gain ground in developing internal education initiatives to supplant and circumvent higher education as the primary pathway to relevant workplace skills.

Revisiting the Higher Ed Act and the Carnegie Unit

Our current regulatory system assumes U.S. higher education equates time spent in class (the Carnegie Unit) with achievement and not necessarily knowledge obtained. It also sets rigid standards around which institutions are eligible – or ineligible – for a student's financial aid dollars.[23] We believe that many of these standards are important and hope they continue. New additions to the 2008 version of the HEA such as the gainful employment rule should be expanded upon, and we believe AI can help students navigate the path from enrollment to the workplace in a way that enhances the ability of institutions to comply with such rules. However, the current structure stymies new, faster approaches to learning such as apprenticeships and bootcamps, and standards such as "regular and substantive interaction" have proved a barrier to institutions seeking to reimagine how learning is delivered. For AI to truly add value to a campus by refocusing where human capital is invested, that needs to change.

As AI creates a more dynamic workplace, we believe individuals may need to re-skill regularly and may not be able to afford the amount of time spent to obtain an additional full degree and learn new skills. The new rule-making committees pursued by the U.S. Department of Education are a good starting point and early signals show that standards might be loosened to accommodate institutional innovation, but the planned rollout for any new rules is mid-year 2020.[24] The PROSPER act is revisiting where financial aid dollars can be applied, which is laudable; however, it is time to reimagine a valid measure of learning, how it compares to other measures of learning and how it all relates to career readiness.[25] A good starting point is the Lumina Foundation-funded Credential Engine, which is seeking to map out how all postsecondary credentials correspond with each other.[26] Creating a transparent landscape of how skills can be acquired, how quickly and at what cost will help create a workforce that is more resistant to obsolescence in the age of AI but will require federal regulation to become more viable.

Empowering Innovation and Transparency in Accreditation

> **"Accreditation in the context of innovation, is essentially a game of Russian roulette."**
>
> ***— Alana Dunagan, The Cristensen Institute[27]***

We do not dispute the principle of industry self-regulation and firmly support the notion of experts in their field being the ones to define standards of practice. However, the current approach to how accreditation is sought and awarded to institutions and programs is structured in a way that discourages innovation and makes it difficult for institutions to pursue new ways of delivering value. Part of this is due to written standards as well as the oral traditions and unwritten rules that govern accreditation processes. In addition, the diversity of accrediting bodies creates an inconsistent understanding of what constitutes quality from one institution or program to the next.

An immediate area of focus to facilitate relevant AI deployment should be how programmatic accrediting bodies define sufficient student to faculty ratios. If a core value of AI is its ability to help faculty scale their work and provide more access to potential learners, that needs to be recognized. A relevant measure of faculty workload and how that workload is focused should be considered instead of an oftentimes arbitrary ratio. Does it matter if the student-to-faculty ratio is 1:25 if those faculty are spending more hours individually coaching students, as opposed to a 1:10 ratio where the majority of faculty time is spent grading and delivering lectures?

In the longer term, accrediting bodies should collaborate to develop a more uniform consensus around what is standard practice and what is open to interpretation. Some standards can be set through federal regulation but if that regulation is heterogeneously interpreted by accrediting agencies, site visitors and peer evaluators, the risk of innovation remains overly high. One area of innovation in the market is coming from the coding bootcamp sector. The Council on Integrity in Results Reporting (CIRR), which objectively tracks graduation, job placement and salary outcomes for students at bootcamps may provide a starting point.[28] In addition, some accrediting bodies, primarily in the medical field (CCNE[29], ACEN[30], ACPE[31]) require institutions to track and report board pass rates and job placement but not salary. Focusing on institutional outcomes as opposed to the assets at hand will enable faculty to create unique approaches to instruction and provide a performance-based impetus for doing so.

Realistic Data Protection

The last substantial amendment of the Family Educational Rights and Privacy Act (FERPA) occurred in 2001 as a part of the USA PATRIOT Act,[32] meaning that the most recent universal U.S. standards for storing and passing student information were written 17 years ago, as of this writing. While court interpretation has allowed legislation to evolve somewhat and some states have implemented their own laws, our current iteration of FERPA predates smartphones, tablets, wireless data, MOOCs and even online education programs. The increasing interconnectivity of data within our lives and the upcoming pervasive implementation of AI on our campuses will be yet another leap beyond the current state of our legal framework.

As our ability to share and gain insights from data increases and AI becomes more autonomous, the industry should consider implementing guidelines about ethical use and the sharing of student data.

Key questions to consider include:

- Should students know who is receiving their information both on and off campus and how that impacts their lives?
- What non-instructional data should institutions and providers be allowed to collect on students and how can that data be used?
- How should third-party AI applications be allowed to access databases on campus that don't directly pertain to their roles?

Re-Imagining the Structure of Academe

> **"None of us (AI experts) think we're going to build a virtual teacher for 100 years or more."**
>
> *— Ashok Goel, creator of Jill Watson*[33]

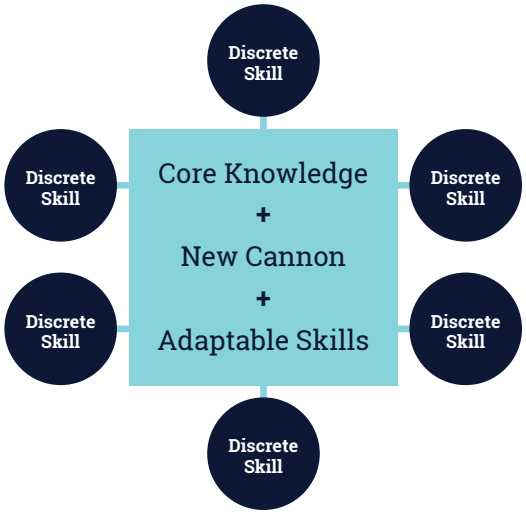
In our view, the core function of education has always been coaching and guiding learners to grow and develop mastery of material. While the concept of a fully automated classroom with AI faculty may one day occur, it is more likely that institutions adopting AI in the educational space will do so as a force multiplier, freeing up faculty from delivering instruction and assessment while allowing more time for them to serve as researchers, advisors and coaches, making more personal connections with their students and delivering more targeted and timely feedback to help deepen learning.

However, as the focus shifts from instructional delivery toward individual advising, institutions will need a new method for calculating faculty load, defining responsibilities and communicating this to regulatory bodies and students. We believe this means that faculty accountability will be tied to the number of students mentored and outcomes attached to those students, and that professors will spend less time grading individual assessments and more time in a data scientist role. As the demands of instruction and assessment become automated, institutions will need to develop an equitable approach to how faculty are utilized and assessed.

Re-Imagining What We Teach

As AI becomes more pervasive and more roles become automated, we will need to revisit what the value of education truly is and how it should be pursued. It seems logical that discrete skills will be the first to become automated while more complex skills remain within the human scope. Education may need to become more modular, providing a strong foundation of analytical knowledge skills around which students can add more discrete professional knowledge as they switch positions. This may mean that the mission of liberal arts, "teaching students how to learn," remains the most important mission of higher education. In fact, newer, innovative institutions such as Minerva are focusing on such an approach – combining a diverse core foundation of analytical skills to create a new modern approach to the liberal arts and its relevance in the world.[34] While the liberal arts remain the common breadth of knowledge that help us form new connections with professional knowledge, we believe that a "new cannon" of knowledge such as data science, computer science, and coding should become integrated into what is commonly taught. In addition to adaptable skills such as team-building, problem-solving and evaluation, this combination of knowledge would allow students to quickly adopt new discrete skills as needed when they switch roles and jobs.

Discrete and professional degree programs such as nursing and engineering, while offering tangible connections to the job market, may run a higher risk of obsolescence or change over the long term.[35] As regulatory and accreditation norms change, applied knowledge sets may be modularized and updated regularly to ensure that skill sets remain relevant. In addition, continuing education will likely become as important as the degree itself to maintain relevancy within a professional field.



PLANNING FOR THE IMMEDIATE FUTURE

While the future has an array of possibilities for higher education, AI in its current state is an investment and not just in terms of funding. Institutions that adopt AI assets will need to consider a variety of factors to be sure that entering the market is the right decision and that they're selecting the right options. Next, we outline several key decision points institutions will need to make.

- **When to Adopt AI:** Institutions need to decide whether to become early adopters, reaping the early rewards and building out the institutional memory within their operations teams now, or to wait until applications are more diverse and scalable. Considerations include whether assets available in the market address their pressing internal needs, the scope of an AI application's footprint on campus and how it will affect existing workflows.
- **Targeting Needs:** Institutions looking for AI solutions should consider the current state of their operational assets before deciding to use AI to expand their student body. Their priority should likely be improving current processes and delivering high-quality service more efficiently to their existing population prior to expanding.
- **Revisit Data Privacy:** As AI becomes capable of gathering and acting upon a range of institutional data including student and employee records, institutions should develop a consensus among stakeholders about what information AI may access and how information is utilized. This should include third-party providers.
- **Define the Upside:** As with all technology acquisitions and procedural changes, institutions should be able to tell a clear story about who artificial intelligence will help and how it will empower them to expand or deepen the institution's mission.

THIS MARKET WILL GROW

Higher education as an industry may be late to AI in comparison to the corporate sector, but we can extrapolate from how it plays out for businesses to forecast for our landscape. A 2018 report by MIT revealed companies that are early adopters of artificial intelligence continue to invest more into AI applications than competitors.[36] In fact, MIT recently announced a billion-dollar investment into an initiative that incorporates AI into all of its programs through the college of computer science.[37] Carnegie Mellon launched the first dedicated degree in artificial intelligence in fall 2018.[38] In short, pioneers in the field are already reaping the rewards and planning to expand AI's footprint in the coming years – we should expect the same across our industry.

About Learning House

Learning House, a Wiley brand, helps people improve their lives through education. As an academic program manager, Learning House offers technology-enabled education solutions designed to meet the needs of a dynamic global market. Solutions include Online Program Management, Enterprise Learning Solutions, The Software Guild, Learning House International, and Advancement Courses. With a focus on data-driven decision-making, Learning House is on the leading edge of higher education. Learning House provides expertise in research and analytics, marketing, enrollment, retention, and instructional design. Through its broad portfolio, Learning House delivers more students, more graduates, and better outcomes.

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