Technology and Tomorrow’s Students

How new tech tools will transform enrollment, career services, and other aspects of the undergraduate experience
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While technology is clearly transforming teaching and learning in higher education, similar forces are also at play outside the classroom around what is often referred to as the “student life cycle” — that is, all the interactions a student has with an institution on the journey from admissions to alumni. From recruitment to enrollment management to student advising to career services, technology is informing, reconfiguring, and re-envisioning the student experience on campus. That impact is likely only to expand in the years ahead.

How might technologies that affect the student life cycle evolve? In some respects, the contours of what the future might look like are evident in practices at colleges and universities today. This report will explore the use of technology and implications for the future in four arenas: managing data well, helping students enroll, enriching student advising, and improving career services.

Managing Data Well
The more sophisticated they become in applying data across the student experience, the more colleges and universities recognize that managing data well is crucial to an institution’s goals for student and alumni success. Further, as colleges and universities come to view data as a vital institutional asset, the clearer it becomes that managerial structures are needed that free data from campus silos and make information broadly available in formats that can spark meaningful action.
Helping Students Enroll
Once more art than science, college admissions has evolved into the technology-driven and technology-dependent practice of enrollment management. Developments today in this arena, including applications of artificial intelligence, portend a future when technology plays an even bigger role.

Enriching Student Advising
A component of burgeoning institutional sophistication around data management is the use of data analytics to inform student advising. Advances today in applications that rely on data to help students succeed set the stage for a future when such tools are more widely scaled and perhaps even more robust.

Improving Career Services
As universities pay more attention to what employers seek from college graduates in terms of skills and abilities, technology can help institutions bridge the sometimes-broad gap between learning at colleges and universities and the workplace competencies that employers need.
Thomas Frey, a prominent futurist and founder of the DaVinci Institute, a future-focused think tank, says that while we cannot fully anticipate how technology will continue to transform our lives, he is certain that one place where change will be abundantly evident is at the intersection of technology and education. Indeed, Frey is pretty sure that a future Bill Gates or Steve Jobs will work in the education space.

“I’m not sure how this materializes,” Frey says, “but I’ve been predicting that the largest tech company online in 2030 will be an education-based company that we haven’t heard of yet.” That’s a huge opportunity for some future entrepreneur, he believes, but “nobody’s quite cracked the code yet.”

The exact nature of that entrepreneur’s business has yet to come into focus, of course, but it’s possible that he or she will add game-changing value by applying new technologies to the student life cycle in higher education. Already, technological forces like data analytics and artificial intelligence are having a significant impact on student life.

Speculating about how technology might affect the student life cycle in the future, Brett McFarlane, the executive director of academic advising at the University of California at Davis, suggests that a deep-set cultural change is under way.

One aspect of that, according to McFarlane, is that institutions are shifting away from focusing on student weaknesses and instead are starting to ask themselves how they are failing students. That’s true at UC-Davis, he says, where colleagues have embraced that new thinking to the extent that they immediately challenge suggestions that students are somehow deficient by shifting discussions back to how the institution could do a better job of serving learners.

Other profound shifts are taking place in college practices. When it comes to enrolling students and helping them succeed, the ability of institutions to effectively collect and mine data is fast becoming an essential institutional competency. Technology is enabling universities to be much more sophisticated in understanding the factors that contribute to student enrollment and success, while also helping institutions intervene early to help individual students meet their academic goals.

Student-advising technology has recently cycled through several distinct phases, according to McFarlane. The early 1990s brought a focus on tools for advising, such as academic transcripts and GPA calculators, followed later that decade by a phase focused on “student-facing tools” such as schedule planners. The next phase — the one most universities are in now, says McFarlane — focuses on institutionwide tools. Meanwhile, though, some institutions have entered a fourth stage, in which universities are shifting away from focusing on student weaknesses and instead are starting to ask themselves how they are failing students. And finally, many institutions are learning how technology can enable them to be more effective in helping students transition from college into jobs and careers.

In the near future, such efforts will likely expand widely across higher education — in effect transforming much of how colleges manage the student journey. In the meantime, the outlines of that future is apparent in how some pioneering institutions are approaching their work today.
Managing Data Well

Student-affairs professionals and other experts talk about a move toward more integration of work across the student life cycle. “We have to look at student success as learning across the institution, and we have to define student success as more than the curriculum or intellectual learning,” says Joe Sabado, the executive director of student information systems and technology and associate chief information officer of student affairs at the University of California at Santa Barbara.

One dimension of technology — data — is widely seen as a tool that can help advance integration of a given institution’s multifaceted efforts.

“Big data — that’s really the breakthrough taking place in real time both in student recruitment and in student completion,” says Trace Urdan, a managing director at Tyton Partners, an investment-banking and consulting company. For recruiting students, Urdan says data provide the means to “be able to tailor outreach more specifically, both in terms of identifying students in more complex dimensions in order to better match them to the schools, and in terms of being able to tailor your outreach to those students on a more customized basis.”

Similarly, analysis of volumes of data yields insights that institutions can apply to help their students complete an academic degree or credential. “The more data you have and can consume, and analyze in real time, the more you’re able to tailor your interactions with the students and intervene in moments when that intervention can make a difference in helping them to complete,” Urdan says.
But just having data is not enough. Institutions are starting to recognize that their ability to deliver on their goals for learners throughout the student’s campus experience hinges in large part on their ability to manage their data assets effectively. Success in the future may well depend on a college’s ability to take a more strategic approach to technology across the institution.

The biggest challenge is not getting data ... but determining how to “present it in a way that’s meaningful and contextualized for all the different stakeholders to take action.”

Universities are learning how to treat data “as an enterprise asset” and are integrating disparate data subsets into “a single analytics view,” says James Wiley, a principal analyst with the consulting and research company Eduventures, part of the National Research Center for College and University Admissions. The biggest challenge is not getting data, he says, but determining how to “present it in a way that’s meaningful and contextualized for all the different stakeholders to take action.”

Scott Winslow, practice manager for the IT Forum, a collaboration of senior IT officers at the consulting company EAB, predicts that, increasingly, data won’t be the province of any single office on campus but will be shared widely. Institutions, Winslow says, will engage more in “creating connectivity across a variety of different silos” to make data actionable. “I think the shift that’s taking place is from digitization to digitalization,” Winslow says. “That is, the application and blending of digital information streams to be able to draw out conclusions and analyses that can be applied to the learning experience, to the research experience, and to all the underlying administrative activities that are taking place inside of a college or university.”

Echoing the notion that critical information will become more centralized, Betsy Tippens Reinitz, director of the Enterprise IT Program at Educause, says that more institutions are recognizing the full power of data as “an institutional strategic asset.” As institutions deepen their understanding of advances that result from the
convergence of such factors as the cloud, mobile technology, social media, and analytics, Reintz suggests that organizations will be transformed culturally “in ways that leverage what the digital world makes possible.”

Another part of this ongoing evolution is a fundamental change in how colleges and universities think about IT writ large. In one sense, this might be couched as a shift in focus from the “tech” in ed tech to the “ed.” Chasing the latest fad in technology has lost luster in favor of a focus on how given technologies can improve student performance and administrative processes. A recent essay in the *EDUCAUSE Review* framed it this way: “Whereas IT’s purview was once limited to delivering technologies, it has evolved to focus on delivering services.”

### Questions to Consider

**How** well do the departments and offices that collect data share that information?

**How** well are the data that your institution owns made accessible to all campus stakeholders whose work can benefit from that information?

**What** specific steps could be taken to ensure more effective and broader sharing of actionable data?
technology and tomorrow's students
Years ago, when the late higher-education consultant Howard E. Holcomb ran admissions for a small private college in the Midwest, he took great pride in announcing at the annual opening convocation each new student’s name from memory. Those days may be gone forever. Today, the art and science of admissions has evolved into the sophisticated business of enrollment management, and recruiting students is definitively technology-driven and technology-dependent. Technology helps universities find prospective students and nurture relationships that will lead them to apply. Technology-driven algorithms enable schools to tailor financial-aid awards with increasing finesse.

Georgia State University, for example, is pioneering the use of artificial intelligence to help address the persistent challenge of “summer melt,” the phenomenon of admitted students who have indicated they plan to attend a college but fail to show up. The problem was significant at Georgia State: In the summer of 2015, 19 percent of the freshman class were no-shows. “Students, especially from low-income first-generation backgrounds, are really left stranded in the summer before they begin college” with no one to answer critical questions about issues like financial aid, registration, and health records, says Timothy M. Renick, Georgia State’s senior vice president for student success.

Georgia State’s chatbot has helped students like Austin Birchell fix financial-aid problems before their first year began.
To address that problem, Georgia State partnered with a start-up called AdmitHub to develop an AI-enhanced chatbot named Pounce, after the university’s mascot. Designed to do a lot of the heavy lifting in addressing student’s basic questions about enrolling, Pounce provides answers to 2,000 questions that incoming freshmen commonly ask about things like financial aid, registration, and housing. Available 24/7, the chatbot answers students in an average of seven seconds.

For the three months leading up to classes in the fall of 2016, Georgia State estimated that Pounce would answer between 5,000 and 6,000 questions for incoming first-year students. In practice, though, Pounce answered more than 200,000 questions. The result? Summer melt was reduced by 21 percent. That meant 300 more students enrolled for the fall of 2016 than had enrolled the previous fall. “Those 300 students are worth about $3 million a year for us in increased tuition and fee revenues,” Renick says. “So yes, I think these technological changes are here to stay, both because they fit the needs of the students we’re serving, and because they’re completely viable from a fiscal perspective and in many cases pay for themselves.”

Renick clearly believes that tools like Pounce will be part of the technology landscape for some time to come. For one thing, he notes, while Georgia State was the first college to use an admissions chatbot, now it has company: as many as two dozen other colleges have since adapted the technology. As for Georgia State, it just received a $900,000 grant from the Michael & Susan Dell Foundation to expand Pounce’s knowledge base so it can answer even more questions.

“These technologies are not just a fad,” Renick says. “I think they are gaining in popularity because they make sense for students. They deliver services students want in a format that students desire.”

QUESTIONS TO CONSIDER

**WHAT** kind of technological enhancements could help your institution recruit students?

**HOW** might technology streamline and improve your institution’s enrollment-management and student-onboarding processes?
Enriching Student Advising

Another harbinger of what the future might look like is evident today in ways that technology is redefining the broad portfolio of student advising. McFarlane at UC-Davis, for example, sees student-success technology as entering a new phase of development.

Technology companies are now recognizing that “there’s a lot of value in creating learning-focused approaches” for all students, McFarlane says, and are rethinking algorithm-based technologies that look just at academics and focus only on students who are falling short. “There’s a lot more emerging technology related to messaging systems referral and follow-up, more advanced academic planners, and tools that help with cognitive and non-cognitive check-ins with students,” he says. Part of what’s driving vendors to change their thinking is that institutions are widening their lens to make sure they provide quality advising not just for students who are at risk, but for all students. Students who need extra help still get that, McFarlane says, but UC-Davis is becoming more intentional about providing “a quality advising experience for every student who enters our doors.”

Going forward, McFarlane suggests, the tools that will work best will be those that ask what students need to be able to achieve their goals, as well as how institutions can structure themselves to ensure students accomplish them. While tools for predictive analytics will continue to add great value, McFarlane thinks more institutions will use such technologies not as an end to themselves but as one part of an integrative approach to student advising. He predicts that work will gradually engage more partners across a campus in more substantive collaboration on behalf of student success. McFarlane envisions a scenario where “10, 20 years down the road, the entire institution is part of that collective” to help students and the institution meet their goals for learning. “Obviously, that would take huge changes in faculty roles, and even the siloed mentality across campus,” he says. “But I think that’s one area where technology
Institutions are “trying to match the skills that the student should have obtained as part of her course and program with the skills required at a job level.”

According to Renick, the university has tracked every student for 800 different risk factors for the past six years. The system looks at student performance nightly and triggers alerts for student who might be at risk. Over a recent 12-month span, the system prompted more than 150,000 interventions, including 54,000 one-on-one meetings between advisers and individual students. Predictive analytics has helped Georgia State graduate 2,800 more students per year than it did before the system was launched, Renick says, with significant gains in degrees conferred to black, Latino, and low-income students.

While noting that higher education is traditionally slow to change, Renick says he sees every sign that new technologies like predictive analytics will likely be part of the landscape for higher education in the years ahead. Supporting that projection is the relative speed with which that technology is already scaling across higher education. “When we launched our use of predictive analytics and advising back in 2012, we were one of maybe three schools nationally that could claim to have a system anything like that,” he says. Today, Renick says, some 450 institutions serving over three million students a year use “analytics-based proactive platforms.”

QUESTIONS TO CONSIDER

**HOW** robust are your institution’s efforts to track student academic performance? **HOW** effective are they in triggering early interventions that can help learners who are at risk?

**DOES** your institution have the right technology available to support its goals for helping learners succeed? **DO** all the right stakeholders, including faculty and advisers, know how to use that technology to effectively help learners?
While technology has been slower to find its role in transforming student career planning, that may be changing. Increasingly, institutions are using technology to help them better understand the skills that employers want when they hire recent college graduates.

“Instead of thinking of career readiness in terms of making sure a student has access to alumni and mentors and understands the job market,” Eduventures’ Wiley says, institutions are “trying to match the skills that the student should have obtained as part of her course and program with the skills required at a job level.” In other words, he says, the future of career services will involve more focus on the skills and competencies that students have gained — perhaps documented using technologies like e-portfolios — not just on which credential they have earned.

Again pioneering technology that has the potential to soon be common across higher education, Georgia State has been one of the first colleges in the country to provide access to a career-based e-portfolio for all its 55,000 students. Students get access to the portfolio when they first enroll, then populate it throughout their academic career with “artifacts” like videos of speeches in class or projects that demonstrate their competencies. Those competencies are mapped intentionally to skills that employers want, like critical
Part of what’s driving vendors to change their thinking is that institutions are widening their lens to make sure they provide quality advising not just for students who are at risk, but for all students.

...thinking, leadership, communication, and understanding other cultures.

...With the e-portfolio, Renick says, “the idea is to provide students a structure where, as students go through the curriculum, they can recognize the connections between what they’re doing in class and in other college experiences and the skills they will need in the workplace.” Potential employers can search the portfolios to find students with specific skills they need. “It’s another way we’re trying to leverage technology to deliver a much more personalized, individualized set of support services to our students at scale — in this case, in the career space,” Renick says.

...“I think these new technologies are transformative,” Renick say. “It’s not a mystery why. We have always known that students from preschool to doctoral programs respond and learn better when they have personalized immediate feedback and individualized attention. The model for education is nurturing, providing feedback, and giving individual support in a timely fashion. That goes back to medieval times.” The challenge for universities like Georgia State, he says, “and quite frankly for 90 percent of universities nationally,” is that they have historically lacked the resources needed to adequately deliver personalized attention. Technology helps level the playing field, Renick says, by enabling colleges like Georgia State, which have relatively small endowments and lots of students who need support, to compete in serving students with richer institutions that have smaller student-to-faculty ratios.

QUESTIONS TO CONSIDER

**HOW** well does your institution understand the competencies that today’s employers seek when they recruit one of your recent graduates?

**HOW** might technology help employers better understand the capabilities and experiences of your institution’s graduates?

**HOW** can technology help your institution deliver more personalized career services?
E
visioning the future of technology in higher education depends on how far ahead you are looking. Peering perhaps a little further into the future than others, futurist Frey sees the potential for “micro colleges” that offer courses in “nugget-sized little pieces.” That might take the form of six- to 10-minute modules that could cost only a few dollars. The modules could be constructed and scaled quickly to meet emerging needs for knowledge and would fit neatly into the lives of busy learners. Take enough of these modules, he says, and you will have learned a new skill. “Teacher bots,” would also be part of the equation. A teacher bot, Frey says, “will hyper-individualize an education. It will learn what our preferred reference points are, what topics we’re interested in. It will know what skills we’re deficient in, what it takes to bring us up to speed. Over time, it will just be able to teach us faster and faster and faster.” With students learning perhaps even 10 times faster than they do today, Frey says “the idea of being able to take an entire college degree in one month may become possible in the future.”

Other changes may be more certain. Reflecting demographic and workplace shifts, for example, the Georgia Institute of Technology recently unveiled “a roadmap for the future of higher education” that is largely predicated on serving more adult students and lifelong learners. Among other plans, the university is creating a new approach to student advising that depends on “a robust learner data backbone” and uses artificial intelligence assistants. Also in the hopper: an AI-based “multifunction virtual tutor.”

Some of the evolution that will take place is likely to be grounded in emerging technologies. UC-Santa Barbara’s Sabado can envision a scenario where sensors linked to the Internet of Things might use cellphone geolocation to note that a student interested in engineering is in a building near where an engineering company is giving a presentation. Assuming the student has granted permission to be tracked, he says, the system might send an alert to the student’s phone about the presentation.

In the near future, however, the student life cycle may look less radically different than the one than futurists envision — but it will be altered nonetheless. If early successes like those at Georgia State are any indication, interventions like predictive analytics, chatbots for admissions, and e-portfolios are likely to scale across higher education in the years ahead.

But what will it take to convert more or less one-off initiatives at pioneering institutions and scale them to become common practice across most of higher education?

And on a more practical level, how can institutions prepare to engage more technology in the student life cycle? EAB’s Winslow advises institutions to focus on the outcomes for student success that they seek, then work backwards from there to find the right technologies to help see those goals to fruition. “Don’t focus on the tool,” he says. “Focus on the outcome.”

“The idea of being able to take an entire college degree in one month may become possible in the future.”
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