Strategies for Digital Transformation in Higher Education

How institutions can bridge the analog divide on their way to a digital future

By Jeffrey Selingo
Foreword

The pandemic was an extraordinary experiential learning opportunity for universities and colleges.

Higher education institutions demonstrated incredible agility and innovation to respond to the challenges and shifting dynamic across the globe. Academic and service delivery models were quickly adapted to support students, and new work from home practices were introduced for faculty and staff. It is clear that these new workplace practices and ways of engaging with students were implemented on an emergency basis and need to be refined. These new ways of learning and working also surfaced and highlighted the digital divide and demonstrated equity issues that must be addressed.

To meet the demand for engaging online, universities and colleges developed new digital capabilities. Great strides were made in cultivating digital fluency as students, faculty, and staff developed new skills to learn, collaborate, and work online. Institutions also learned how to deploy new solutions rapidly or at “cloud speed.”

At Humber College, digital transformation is guided by the institutional Digital Campus Plan. The progress and investments made have returned many benefits, including greater agility, increased access to innovation, development of digital fluency, and improved security. This foundation supported the institutional response to the pandemic enabling changes to academic delivery models, new services to enhance student experience, development of new business models, and actions to bridge the digital divide.

Members of the higher education community are reflecting on their personal experiences, and the expectations of institutions continue to shift. At the same time, students are expressing a greater desire for more personalisation of their learning journey that may include a combination of on-campus and online delivery. Faculty and staff have new ideas about the future of work that reflect broader conversations taking place in society, and all members of the community are looking for simplicity, ease of use, and human connection.

The digital capabilities and competencies developed in the last several years are a tremendous step forward and, at the same time, a foundation for the future. That future will likely include a combination of the metaverse (or metaverses), Web3, new applications of artificial intelligence, and quantum computing. Institutions need to plan and harness these new competencies to innovate and develop equitable access to remarkable experiences for students, faculty, and staff as part of a vibrant campus community.

In the pages that follow, you will learn about a blueprint that is emerging for higher education leaders to follow to turn the emergency learning of the pandemic into long-term, sustainable change for the future.

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Key Findings

- Covid-19 only upped the pressure for digital transformation across higher education. Instead of being seen as a service provider like a utility, technology must be embedded in every aspect of campus life to increase student success, research prowess, and prestige.

- Digital transformation means fundamentally stepping back and reconceiving the classroom, the student journey through colleges and universities, the campus workplace, and how research is conducted.

- When well executed, a digital transformation strategy can influence every aspect of a university’s mission from improved student outcomes to operating efficiencies to research with an impact.

- While college and university presidents believe that they’ve been leading in digital transformation given their huge investments in technology over the last decade, the reality on many campuses is that technology has been mostly adapted to fit the old way of doing business.

- The good news is that institutions still have time to close the digital gap and build a real, long-term competitive advantage coming out of the pandemic by focusing on four areas on campus to drive digital transformation.

- Those four areas include modernizing campus information systems; blending different streams of data on campus stakeholders for better insight; using technology to enrich the student experience; and harnessing computing power to accelerate research breakthroughs.

- The imperative for digital transformation has many university leaders overwhelmed and struggling to cope. In the pages that follow, this brief lays out a framework for a strategy.
While institutions have upgraded their legacy student and financial systems, the interconnected and seamless “digital campus”—with cloud-based technologies delivering insights, data-driven decisions, and customising the student experience using advanced analytics—has proven elusive.

Covid-19 only upped the pressure for digital transformation across campuses. What was once thought of as a short-term pivot to “emergency remote education” at the beginning of the pandemic is fast becoming a new normal. Learning, research, and the academic workplace itself are all undergoing a radical rethinking of their traditions and way of doing business. It’s clear that optionality is expanding in every sector of the economy—and higher education can’t return to its legacy offerings and expect to survive. Students are increasingly making less of a distinction between campus-based and online education: it’s all learning to them, much like shopping is a blend between physical and online outlets.

But given the constraints of their culture and operating models, most universities find offering greater optionality a challenge. Without increased digital capabilities to free faculty, researchers, and staff from burdensome processes and bureaucracy, as well as arm them with the tools needed to expand their own digital IQ, efforts to innovate the traditional university model will fizzle. Enhanced digital capabilities hold the promise to modernise every aspect of the student, professor, and staff experience. That, in turn, would allow higher education to offer more engaging learning experiences, improve student outcomes, and operate more efficiently.

“We’re not going back to 2019,” says Arthur Levine, former president of Teachers College, Columbia University (United States), and a longtime scholar of higher education. The pandemic was a turning point, he says, something he saw while researching his new book, *The Great Upheaval: Higher Education’s Past, Present, and Uncertain Future*. “Universities need to operate differently by breaking down silos between departments, between schools, even between other universities.”

Higher education leaders believe they’ve been doing that given their substantial investments in technology over the last decade. However, the reality is that technology has been mostly adapted to fit the old way of doing business. In other words, technology was the end in itself, rather than the means to achieve a full-scale transformation.

Findings from a global focus group of higher education leaders convened by HolonIQ in 2021 found that university officials believe they have gaps across their human capital, their processes, and their technology when it comes to achieving digital transformation, although the severity of those gaps depends largely on institutional size.

Instead of being seen as a service provider like a utility, technology must be embedded in every aspect of campus life to increase student success, research prowess, and prestige. Digital transformation means fundamentally stepping back and reconceiving the classroom, the student journey through higher education, the university workplace, and how research is conducted.

The digital transformation of higher education is now a necessity.
Digital transformation on campuses cannot be achieved with one particular initiative. Rather, several components are necessary to enable a strategy that reinvents traditional ways of interacting with students, academics, and researchers.

Modernising and Securing the Academy

Digital transformation requires a good foundation—and typically that means migrating to the cloud. Cloud computing allows institutions to increase the speed of their operations. Freed from worrying about critical system updates, IT staff can work on strategic projects rather than infrastructure; similarly, the cloud can relieve academics and staff from repeating low-level tasks in various legacy systems.

DELHI UNIVERSITY (India)
The university was concerned about the risk of ransomware attacks—which have surged in frequency on campuses—as well as the impact of natural disasters on its technology backbone. So Delhi migrated their disaster recovery systems to the cloud, which continuously replicates the infrastructure into a low-cost staging area that can be retrieved quickly during a real disaster.

Enriching the Student Experience

The student experience encompasses every aspect of an institution’s offering. Technologies such as chatbots, smart speakers, and virtual computer labs enable frequent and customised digital interactions with students, giving them access to learning resources anytime and anywhere. By better designing and delivering every interaction with students, higher education can ultimately prove its value and raise retention.

SAINT LOUIS UNIVERSITY (United States)
In 2018, the university deployed smart devices to every campus residence outfitted with a chatbot programmed to answer questions, from “What time does the library close tonight?” to “Where is the registrar’s office?” Since then, the chatbot has expanded the number of questions it can answer and where it can answer them, reserving human interaction for higher-level questions.

Turning Data into Wisdom

Real-time data provides insight to leaders about students, the workforce, and finances, giving them the opportunity to more quickly respond to changes. By blending different data streams about classroom use and campus infrastructure, for example, institutions can better understand how to operate more sustainable operations, as well as draw out data on the impact of their research on society.

THE UNIVERSITY OF WATERLOO (Canada)
Waterloo built a data lake that housed largely unstructured data, making it more malleable than a data infrastructure assembled within academic and administrative units. Now, for instance, the university, which operates the largest student co-op program in the world, can sort through job descriptions for key words that help students understand the skills they need to get hired.

Accelerating Research

To win academic research funding, institutions need to manage and manipulate massive data sets and leverage artificial intelligence. Such tools enable faster analysis in reaching conclusions and free up valuable time for teachers and researchers to publish their findings, teach, and assist students.

HIGH ENERGY ACCELERATOR RESEARCH ORGANISATION (Japan)
Known as KEK, the research organisation built a cloud solution to reduce computation time of their on-premises systems for analysing protein structures that support the discovery of new drugs. Researchers saw a seven-fold increase in the speed of providing calculations for the main portion of protein structure analysis and a 60% reduction in the cost of infrastructure construction and management.
A SHORT RUNWAY TO DIGITAL TRANSFORMATION

The good news is that colleges and universities still have time to close the digital gap and create a real, long-term competitive advantage coming out of the pandemic. But the runway is short for higher education and governments around the world for three key reasons.

First, higher education is evolving into the world’s newest natural resource and a valuable asset for countries to have. In the last decade alone, across the developed world, the proportion of young people with a postsecondary degree has increased by 10 percentage points, on average. In some places, enrolment rates in tertiary education have climbed past the 50 and even 80 percent share of young adults—making higher education nearly as universal as primary/secondary education in a handful of countries. The remarkable ascent of China, India, and Brazil, along with other middle-income countries, has upped the pressure on nations everywhere to

FIGURE 2

The Current State of Digital Transformation in Post-Secondary Education

Universities remain behind outside technology organisations that work in the sector in terms of adopting a digital transformation strategy and then putting one in place.

Distribution of Digital Maturity

Respondents: University  Non-university

Digital transformation is not only about the technology; it’s also about the underlying processes that get the work done, as well as the people who perform the work. Here is where institutions of different sizes see their greatest gaps in digital capability:

Source: HolonIQ Higher Education Network of more than 3,800 leaders and professionals working within higher education along with organisations that service and support post-secondary education across more than 80 countries

Greatest Gaps in Digital Capability

For 2021: People  Process  Technology

Note: A small institution is defined as fewer than 5,000 students; medium: 5,000–20,000; large: more than 20,000 students.
improve access to higher education. Doing so by building classroom spaces alone is impractical, expensive, and runs counter to the expanding digital capacities of learners and the global economy as a whole.

Second, demand for upskilling and reskilling will soar as occupations and industries expand and contract and skills evolve in the face of advancing automation and artificial intelligence. What should be worrisome to political and business leaders alike is that across the world too many young people still follow an old model of formal education: after secondary school they simply stop. The average enrolment rate of 20-24-year-olds in education—even in high-income nations—is about half that of 15-19-year-olds. Yet higher education has become the minimum entry ticket for workers globally. Only 11 percent of those in their late twenties with a university degree are considered NEETs—Not in Education, Employment, or Training. That compares to 17 percent without a university degree and 39 percent without a secondary school diploma.

Third, the competition for scientific and engineering research funds will increase as more institutions look to gain an edge among the world’s top research universities and prove their social and economic value to their communities and to society. Increasingly, among the most important global higher education rankings are those that measure how well universities are contributing to the United Nation’s Sustainable Development Goals.

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Digital Priorities vs. Digital Capabilities

What universities say their priorities are...

[Diagram showing critical, high priority, medium priority, low priority, not a priority ratings for recruitment and mix of academic programs, learning design, learner experience, work and lifelong learning]

...don’t always line up with their capabilities.

[Diagram showing excellent, strong, moderate, emerging, little or none ratings for recruitment and mix of academic programs, learning design, learner experience, work and lifelong learning]
FOUR PILLARS OF DIGITAL TRANSFORMATION

The imperative for digital transformation has many college and university leaders overwhelmed and struggling to cope. Where should leadership teams start and how can they think systematically about what to do next? What are the best ways to use technology to engage students and academics?

In my research and interviews with more than three dozen college and university leaders, technologists, and officials serving higher education, I have identified four ways to drive digital transformation in higher education over the next several years.

1. Modernise Campus Information Systems

Before the pandemic, higher education as a whole was slower than other industries in moving their vast and bulky information systems to the cloud. Many institutions still owned the software and hardware that housed student information, human resources, and finance and kept their systems on campus in data centers.

The coronavirus exposed the lack of a reliable digital backbone at scores of universities. To ensure the IT infrastructure was working and updated, staff members were forced to come to campus in the early days of the Covid-19 outbreak. Many systems cracked under the weight of heavy usage leaving administrators unable to plan in that critical period because they lacked real-time data about their operations.

Much of the discussion about higher education’s response to the pandemic was whether campuses got online classes up and running quickly. But my interviews uncovered that a rapid response on the academic front was largely made possible by digital plumbing laid years earlier.

“We were planning for a pandemic before we even knew what a pandemic was,” Param Bedi, vice president for library and information technology at Bucknell University (United States), told me.

Bucknell is a residential university. It’s a very traditional institution focused on in-person education. So it’s not the type of campus one would expect to be a leader in digital transformation.

But six years ago, Bucknell started planning the move of its enterprise systems to the cloud, which was completed in 2018. “We’re not in the data center business; we are in the education business,” Bedi says. But freed from worrying about critical updates to systems, the IT staff estimates it found 40 percent more time to work on strategic projects with faculty and students, such as expanding the use of geospatial technologies in teaching and research as well as visualising and analysing data for students in different majors.

Toward Digital Transformation

In interviews, university leaders and technologists provided the following advice to navigating the pathway to digital transformation:

Focus on the outcomes.

With so many possibilities, it’s easy to get overwhelmed. What is it you want to achieve—better graduation rates, more engaged students, research with more impact?—and then focus your efforts in those areas.

Start with the supporters.

On most campuses there are departments and schools that are more innovative than others, willing to experiment and try things. Try to start new digital initiatives in those areas to serve as proof points for others.

Improve digital literacy.

Research shows that most people aren’t very good at interpreting and making sense of data. Build peer-to-peer learning networks or encourage key employees to enroll in data literacy and science courses.
“We shifted away from being the people who are going to run the systems to people who are going to help you make well-informed decisions or work on projects using digital tools,” Bedi says. “That’s been the big shift, and we saw the real benefits during the pandemic.”

**2 Blend Data Streams for Better Insights**

Universities are awash in data, but institutional leaders are often at a loss about how to interpret and make sense of it all. Turning that data into wisdom is what ultimately drives institutions to become more efficient and innovate.

Consider the millions of data crumbs generated each day on campuses by temperature and lighting sensors, Wi-Fi nodes, as well as connected devices, such as smart speakers, watches, and locks. Toronto Metropolitan University (Canada) has worked for several years to structure all of its campus data into an interactive data visualisation dashboard to enable officials to better understand space utilisation and troubleshoot issues in buildings.

“You can look at any given space and see facilities management data,” says Jenn McArthur, an associate professor who leads the university’s Smart Buildings Analytics Group.

With the data it is collecting, the university is beginning to visualise the sensor and system data (redacted for privacy reasons) to create a full digital replica of the entire campus. Such digital representations allow those managing the physical plant to simulate events, such as shutting down systems to conserve energy. One recently completed 19-story building on campus, for example, has more than 10,000 automation points, giving officials insights on trends about its energy consumption, other facility information, and usage patterns in a single place.

“These were siloed systems that were never designed to speak to each other,” says McArthur. “Now we can actually get useful data from them.”

**3 Employ Technology to Improve the Student Experience**

A focus on digital transformation offers institutions the opportunity to improve the overall student experience and reduce the frustration learners often face in their day-to-day interactions on campuses. Enhancing the learner experience creates a more inclusive future for higher education because it meets students where they are, in terms of how they learn, how they connect with peers and mentors, and, fundamentally, whether they feel a sense of belonging and purpose to their education.

The challenge in higher education, however, is that few of the people responsible for the student experience have given sustained thought to how their separate decisions shape a student’s pathway through an institution. To the extent they do think about it, they all have different ideas of what the student experience means, and no one oversees the entire journey. What’s more, higher education still tends to prioritise intuition and experience over data. Too often decisions are based on anecdotes and the gut instincts of administrators, staff, and academics.

At Keele University (United Kingdom), officials unearthed new insights about prospective students during the pandemic when the institution had to shift its on-site call center to a remote digital system for what’s known as Clearing. That’s when
UK universities fill their remaining seats with students who weren’t matched with their preferred institution.

“For the first time, we had complete visibility around the number of calls coming in, how long they were waiting, if operators needed to pass them on to someone else for further information or collect more details,” says Daniel Perry, Keele’s chief information officer. “Seeing statistics about call demand by course type, who they were trying to contact, all of that was new to us and really valuable information.”

Operating during a global pandemic gave universities like Keele permission to act differently. “Culture takes an awfully long time to change in a university,” Perry says, “and this was a great kind of beachhead into doing more.” Now the university is focused on what it calls the OneKeele plan to build a seamless recruitment and admissions pipeline and student experience as well as gain a coherent view of campus operations. That requires university services to run reliably and be accessible 24/7 from any location, on any device. “We want to create an easy on-ramp and a responsive experience for students,” Perry says.

Harness Computing Power to Accelerate Research Breakthroughs

The digital transformation of higher education also reaches into the research function of universities. Today, academic research increasingly depends on high-performance computing, big data, and artificial intelligence to drive innovation and discovery. As a result, streamlining systems in the cloud that allow researchers to collect and mine data, test concepts, and collaborate with their counterparts around the world are all critical to running the modern research university.

The urgency to increase the speed and efficiency of research is only heightened by the need to solve the world’s greatest challenges, such as climate change. That’s an issue researchers at the National University of Singapore’s Urban Analytics Lab work on by exploring urban data sets to help quantify how cities are designed and built. Previously, with just one server located on campus, researchers could only process data for small geographic areas. Moving to cloud-based, high-performance computing allowed them to scale their work and import OpenStreetMap—a crowdsourced geospatial dataset for the entire world—into their research.

“Some things are possible only with high performance computing,” says Filip Biljecki, a professor at the National University of Singapore. “What we could previously do on a small scale, like a neighbourhood, we can do now at almost a global scale.”

That means scientists in the lab can provide in-depth analysis on almost any location around the world and improve on existing research. For instance, researchers plan to use machine learning to calculate building heights in the OpenStreetMap, which until now has housed mostly two-dimensional data. Such information can help urban planners estimate noise pollution and wind flow.

Another byproduct of migrating to cloud-based, high performance computing is that the National University of Singapore can invest what would have gone into their own high-capacity servers to other functions and bring in research teams from anywhere without the restrictions of internal VPN access.

A FINAL WORD

In the end, higher education is a human-centered enterprise. So the argument has always been that technology can go only so far to transform the underlying business model. But these examples of digital transformation show that change is enabled by technology but still has people at the core. Technology offers educators, as well as researchers, a new level of insight, providing powerful opportunities to refine and improve their courses and research and to ultimately engage more effectively with students and their research subjects at the human level.
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