Digital Teaching and Learning

Innovation for Today's College Students

Colleagues:

Today's students follow many different paths to a certificate or degree, particularly as they juggle work and family obligations. And they often encounter challenges on that path, whether it is getting the academic or financial help they need, accessing courses that fit their schedules and busy lives, or navigating the transfer process if they need to change institutions.

Colleges and universities have been hard at work for over a decade to tackle these challenges and have developed innovative approaches to help more students stay on the path to achieving their educational goals.

Our innovation portfolio features a focus on digital teaching and learning because today's college students are more diverse, ambitious, and eager to realize the benefit of a college degree. Online, blended online, and in-person courses and programs offer students a flexible path to high-value degrees and credentials while balancing work and life demands — which is especially important in uncertain times, such as we've seen during the COVID-19 pandemic.

Students want these opportunities. A recent survey found that nearly three quarters (73%) of students would like to take fully online courses in the future and that more than two-thirds (68%) would like to take blended online and in-person courses in the future.

And college and university leaders are responding. At least three quarters of presidents surveyed reported that they plan to keep offering increased online learning options post-pandemic.

Our priorities in this area include supporting the creation of "best in class" digital courses and programs and providing high-quality resources and training to faculty and instructional staff. Our vision is to turn "gatekeeper" courses into "gateway" courses as part of our continuing work to eliminate race, ethnicity, and income as predictors of student success.

We are pleased to support Inside Higher Ed in its efforts to bring focus to innovation in higher education and hope you will gain insight and inspiration from the stories and perspectives contained in this booklet.

In partnership,

Bill & Melinda Gates Foundation

Introduction

Few issues in higher education today capture as much interest as digital teaching and learning.

New courseware aims to reduce equity gaps. Artificial intelligence could be used to change the way online exams are given. Community colleges look to new coalitions to spur the sharing of courses. All of these efforts reflect issues that have been with us since before the pandemic. But the pandemic gave these efforts new urgency, as many students and professors gained new experience with remote learning. The articles in this compilation explore those and many other efforts.

Inside Higher Ed will continue to track digital teaching and learning. We welcome your reactions to the articles in this booklet and your ideas for future coverage.

−The Editors
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Innovation Priority:
Developmental Education

Today's students are diverse and ambitious. They aspire to succeed in college and careers but too many have encountered obstacles that prevented their success. Every student deserves a strong start. And not all of them have that. We invest in redesigning gateway courses and removing the obstacles of traditional remediation so that students can stay on the path to achieving their goals.

Courseware Designed to Close Equity Gaps

Coalitions of companies, colleges and research groups, funded by Gates, will develop digital courses especially aimed at improving learning outcomes for underrepresented students in gateway statistics and chemistry courses.

By Doug Lederman // February 25, 2021

The gaps remain stark: first-year students of color and learners from low-income backgrounds wash out of entry-level "gateway" courses at significantly higher rates than their white peers. Those early setbacks contribute significantly to the higher dropout rates that Black, Latino, Indigenous and Pell Grant–eligible students experience between their first and second year of college, and they ultimately are a factor in the persistently lower graduation rates for students from these groups.

Individual colleges and universities, national groups and philanthropies, and a slew of companies have worked in recent years to address this seemingly intractable problem. But a new initiative, still in its early stages, aims to bring all those players (and more) together to build high-quality, low-cost courses in 20 general education subjects that enroll the most students nationally.

The courses, the first of which are in Introduction to Statistics and general chemistry, will be specifically designed to increase the odds that students from all backgrounds and academic preparation levels have an equitable chance to succeed in those key courses—and ultimately in college. They will also be openly licensed, come with signifi-

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cant faculty training and support, and be rigorously evaluated by researchers to ensure that they are achieving the desired goals.

The Bill & Melinda Gates Foundation is the driving force behind the new initiative, providing millions of dollars to the two coalitions of about two dozen organizations involved in designing, building, testing and evaluating the new courses. In total, Gates will spend as much as $65 million over four years on the work around these courses, with a significant chunk of it going to three major projects this year.

Lumen Learning, which builds digital courseware using open educational resources, is leading the creation of the Introduction to Sta-

tistics course, in conjunction with organizations such as Digital Promise and the Association of Public and Land-grant Universities, and institutions such as Howard University, Rockland and Tallahassee Community Colleges, and Santa Ana College that serve large numbers of minority students. Lumen will receive a $5 million grant.

Arizona State and Carnegie Mellon Universities are spearheading the development of the chemistry course along with OpenStax, the Rice University spinoff that creates free and flexible textbooks, as well as other partners.

And MacMillan Learning, a publisher-turned-technology company, will conduct research on the intro-

ductory sociology and psychology courses it delivers through its digital platform Achieve to gauge whether they can deliver sufficiently equitable outcomes for racially and socioeconomically underrepresented students.

"The generally accepted understanding is that despite a ton of effort, gateway courses are still leading to perniciously bad outcomes for many students from underrepresented backgrounds," said Alison Pendergast, senior program officer for digital learning at Gates. "Our goal is to help the market see what exemplar courseware looks like that can lead to equitable outcomes for students."

Gates has been at this work for some time, having undertaken numerous initiatives over the last decade aimed at increasing the use of digital courseware in service of its overall goal of "improv[ing] student outcomes and ensur[ing] that race, ethnicity and income are not predictors of postsecondary success."

A few things appear to differentiate this effort from its past work.

First, the foundation has clearly been influenced by the societal circumstances of the last two years, in which the COVID-19 pandemic has exacerbated existing inequity by disproportionately deterring the educational plans of learners from minority groups and low-income backgrounds, and the Black Lives Matter movement has highlighted racial inequities in many realms.

Secondly, Gates, which has been criticized in the past for sometimes embracing technological solutions and

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adopting a "we know best" attitude, is emphasizing that the courseware developed through this initiative (a) is designed for blended—not fully online—educational settings, (b) will be heavily influenced by research involving underrepresented students and their instructors, a first for the foundation, and (c) will be accompanied by significant investments in training and support for the "humans" (Pendergast's word) who will make the courseware work: professors and instructional staff.

"In the past we've typically focused on technology" in its push for better courseware, Pendergast said, acknowledging a tendency that has rubbed Gates critics the wrong way. "But we know that courseware is implemented by faculty, and that they need more support and better professional development tools, as well as good data to drive improved instructional practice."

A Closer Look

The Lumen Learning–led project to develop introductory statistics

course materials, which will cost no more than $40 a student, is furthest along so far. Lumen was among the companies, publishers, nonprofit organizations and universities that responded to a request Gates submitted inviting proposals to build courseware specifically designed to address racial and socioeconomic equity gaps.

Kim Thanos, founder and CEO of Lumen, said her company had submitted a proposal in part because the upheaval of the last two years had prompted her to ask whether she and the company "are doing enough on the issues of race and income." She said, "Like a lot of people, we took time to pause and reflect. We feel proud of the work we've done, but have we done enough? Have I done enough? I didn't feel like we had … We see this project as a way to begin to address that."

A news release from Lumen said that its task was to "create new courseware for Introduction to Statistics that can serve as an ex-

emplar of courseware centered in equity that makes a meaningful difference in student success."

What might be the elements of courseware for a statistics course that would make it more relevant to, or less likely to deter, a Black or low-income student? Isn't statistics color- (and income-)blind?

Thanos cited a few areas where publishers and designers of curricula and courses have frequently fallen short. First is the content, and its relevance to students' "lived experience," which can be crucial to whether students feel a sense of belonging in the classroom.

"Are all the examples brought in white Western examples? Do we only show evidence of success in this discipline for white men?" Thanos said. There's been a lot of work done on diversity, equity and inclusion around learning materials, but it's often "a very superficial coat of paint."

Secondly, she said, "there is no such thing as courseware or technology that's learning agnostic—technology has a perspective on things like how well-prepared users are, and a lot of technology fails to recognize that some students might be coming into the environment with less preparation or experience."

For instance, Lumen's recent work in testing out its existing courseware in learning centers at colleges like Rockland that serve many minority students revealed that "if I'm a minority student, I may be very reluctant to acknowledge I need help, because I'm already feeling like I don't belong," Thanos said.

Faculty members often tell students to seek help via email, a mode of communication that typically demands a professional tone. "So you're telling me that in this moment I'm struggling, I need to craft an all-important email," Thanos said. "Why not help them with some email templates? One of the solutions we're planning is a tool that would populate the draft of an email message for various things, like seeking help from a professor, to reduce my anxiety about reaching out."

Lumen also plans to use its Lumen Circles professional development tools for instructors—an outgrowth of its 2020 purchase of the assets of Faculty Guild—to provide faculty training in "practices that demonstrate caring, an element often left out of faculty support," Thanos said.

Versions of the courses from Lumen and the Arizona State/Carnegie Mellon collaboration are set to be available for pilot testing at institutions with significant populations of students of color in 2023, with significant user and efficacy testing to follow.

Gates isn't in a rush, and its officials appear to have embraced the message that technology without instructor support and understanding the context isn't enough.

"We're still bullish on the power of technology to help students," said Pendergast. "But you need a lot more than that—user and efficacy research, faculty training and support on effective teaching practices, and better institutional supports—if you really want to improve outcomes." ∎

Innovation Priority:
Digital Teaching and Learning

Teaching and learning have always been and will always be about people. Today, students are more mobile than ever before, and COVID-19 is forcing colleges and universities to pursue innovations in how and when they deliver effective learning to students. We invest in tools and knowledge that can help educators and students experience a high-quality learning experience anytime, anywhere.

Time to Rethink AI Proctoring?

Proctoring companies that use artificial intelligence to monitor students' behavior during online exams typically require university instructors to review footage of unusual activity. But is that human oversight actually happening?

By Lindsay McKenzie // May 28, 2021

Online exam proctoring company ProctorU announced earlier this week that it will no longer send artificial intelligence-generated reports of potential student misconduct to institutions without ProctorU staff members first reviewing the footage -- a development raising more questions than it answers about higher education's use of the technology.

ProctorU, like many companies offering remote proctoring services, employs AI technology to monitor student movement during tests and flag activity that might indicate a student is cheating. Typical behavior that may be flagged by the AI includes students getting up from their seats, not looking consistently at their screens or talking out loud.

Previously, as part of its cheapest proctoring package, ProctorU sent AI-generated incident reports to instructors without staff members reviewing them first. The company offered this package on the condition that any AI-generated reports would be reviewed by instructors. But that wasn't happening, said Jarrod Morgan, founder and chief strategy officer of ProctorU.

"It's not appropriate for AI to be making decisions, and it's unfair to expect faculty to do that work," Morgan said.

SMITH COLLECTION/GADO/CONTRIBUTOR/GETTY IMAGES

Online exam proctoring company ProctorU will have humans review AI reports of possible student misconduct on tests before forwarding them to colleges and universities, it said this week.

The company will continue to use AI, but two ProctorU staff members will now review webcam footage to try to ensure that students are not penalized inappropriately for innocent actions. This is particularly important for students granted special accommodations, Morgan said.

Finding a way to ensure that there is human oversight over academic integrity decisions is something that ProctorU has been discussing for a long time, Morgan said. During the pandemic, when use of remote proctoring software exploded, it became undeniable that the proctoring services were not being used as intended, he said.

Some institutions use online proctoring simply as a deterrent and rarely proceed with disciplining students when AI flags suspicious behavior. But others do not understand the AI is fallible and may act on reports without reviewing them, said Shea Swauger, a librarian and researcher at the University of Colorado at Denver who is critical of instructors' reliance on online proctoring tools.

This can be a problem, because companies avoid responsibility for making the call on what is and is not cheating.

"It's pretty standard for all proctoring companies that are offering AI-assisted or fully AI monitoring services to encourage faculty to review any flagged behavior before making any academic integrity judgements," Swauger said.

"That's kind of the main way that these proctoring companies are sidestepping accountability when it comes to discrimination. No company is saying that they determine if there is cheating. They all say that they flag suspicious behavior, then it's up to individual institutions to determine if there's cheating."

The potential to discriminate against students with disabilities, students who are neurodivergent, students of color and even caretakers and parents is high when remote proctoring services rely on AI and not human judgment, Swauger said.

Even with human judgment, there is room for implicit biases and discrimination, Swauger said. If you're a faculty member and you're constantly being alerted that students with disabilities or medical conditions and students of color are suspected of misconduct, there is a possibility that will change how you interact with those students, he said.

"Even if you never have a finding of academic misconduct, that repeated suspicion could trigger implicit biases and discriminatory responses from faculty," said Swauger.

It is positive that there may be fewer instances of students being accused of cheating when they did nothing wrong, said Amelia Vance, director of youth and education privacy at the Future of Privacy Forum. Still, she sees potential for things to go wrong when people are involved in making judgments. She wants to know more about the training that ProctorU staff members receive.

By making such a public statement about its change of heart, ProctorU hopes to differentiate itself from its competitors and deflect some of the negative press that online proctoring companies have recently received. But Swauger says he feels the move is little more than a PR stunt.

"I'd describe it as ethics-washing,"

Swauger said.

ProctorU's competitors do not appear to be ready to follow in the company's footsteps by imposing similar limits on the use of AI technology in online proctoring.

"It's a bit funny they chose to lob grenades over their shoulders as they exited the room," said Jodi Feeney, chief operating officer of online test monitoring company Respondus, in an email. The vast majority of online proctoring sessions in higher education use automated systems instead of human proctors because they are much more cost-effective, she said.

"I don't think ProctorU was committed to cannibalizing their lucrative human proctoring service," Feeney said. "A typical university using Respondus Monitor spends less than 25 cents per proctoring session. Live, human proctoring often costs $25 per exam. The price points and services are entirely different." ■

https://www.insidehighered.com/news/2021/05/28/are-colleges-checking-ais-work-remote-exam-proctoring

Community Colleges Seek to Share Classes Online

A national online course-sharing consortium for community colleges aims to expand access to online learning. It's also an attempt to relieve budgetary and enrollment pressures after a particularly challenging year.

By Lindsay McKenzie // May 27, 2021

Hundreds of community colleges could one day share online courses after the launch of a new network called the League for Innovation Online Course Sharing Consortium.

The League for Innovation in the Community College, a nonprofit membership group whose mission is to cultivate innovation in community colleges, announced the launch of the new online course-sharing consortium today.

The course-sharing consortium will be open to League for Innovation in the Community College members to join. The membership group currently has a few hundred institutional members, most of which are based in the U.S., but some of which are also located internationally.

The League for Innovation Online Course Sharing Consortium will work with a company, Acadeum, to establish online course-sharing partnerships between participating institutions. The company will provide a course-sharing platform as well as administrative support to the consortium.

"This new consortium will help community colleges better meet learners' needs by arranging student access to courses that are unavailable at their home institutions," said Cynthia Wilson, vice president for learning and chief impact officer for the

COURTESY OF THE LEAGUE FOR INNOVATION IN THE COMMUNITY COLLEGE
The League for Innovation in the Community College is launching
a new online course-sharing consortium today.

League for Innovation in the Community College, in a statement. "This initiative is also about harnessing the collective expertise and capacity of community colleges to improve flexibility in scheduling for students seeking in-demand courses."

University and college consortia that enable institutions to share resources have existed for decades, but there are relatively few higher ed consortia dedicated to online course sharing. Even fewer were specifically created to support online course sharing for community colleges. The leaders of the League for Innovation Online Course Sharing Consortium believe their network is the first to facilitate online course sharing for community colleges at a national level.

By acting as an intermediary between institutions that are sharing online courses, Acadeum can reduce many of the headaches associated with course sharing for college administrators, instructors and students, said Joshua Pierce, co-founder and CEO of the company.

Consortium Members
The following community colleges are currently participating in the newly formed League for Innovations Online Course Sharing Consortium:

- Austin Community College in Texas
- Lamar Institute of Technology in Texas
- Montgomery County Community College in Pennsylvania
- Tarrant County Community College in Texas
- Yavapai Community College in Arizona

Community Colleges Seek to Share Classes Online (cont.)

Acadeum draws up partnership agreements between participating institutions, ensures all the necessary state rules and accreditation requirements are being met, and handles finances so that students can continue paying tuition to their home institution, even as they take classes that are delivered by another institution. Course sharing within the new consortium is likely to be up and running this fall, said Pierce.

Acadeum manages dozens of consortia comprised of four-year institutions. But it previously had just one consortium for public two-year institutions -- a network of community colleges in Texas called Digitex. Digitex, also known as the Digital Higher Education Consortium of Texas, covers 50 community college districts in the state. Of those, 18 are currently active in sharing online courses through the partnership between Acadeum and Digitex, but more may join in the future.

So far, five community colleges have signed up to participate in the League for Innovation Online Course Sharing Consortium, including two Texas-based community colleges that already participate in class sharing through Digitex. Four of the institutions that have signed up to participate in the new national course-sharing consortium will be offering their existing online classes to students from other member institutions. One, the Lamar Institute of Technology in Texas, will not offer any online classes but has indicated interest in its students attending classes taught by the other institutions.

The Lamar Institute of Technology joined the consortium in order to provide additional courses to students to meet pathway initiatives and address human capital issues, said a spokesperson for Acadeum in an email. The institution told Acadeum that it was having particular difficulty finding enough qualified math instructors and that it later hopes to offer online technology courses through the consortium.

Establishing course-sharing partnerships between community colleges, particularly when they are located in different states with their own regulations and requirements as well as different tuition pricing, is more complex than establishing partnerships between four-year institutions, said Pierce. Community colleges often have a lot of autonomy, and there are multiple offices dealing with student billing and other administrative functions, he said.

The success of Digitex's partnership with Acadeum was central to getting members of the League for Innovation in the Community College on board with the idea that online course sharing could work among their member institutions, said Rufus Glasper, president and CEO of the League for Innovation in the Community College.

"Acadeum came to us and believed this model was replicable and scalable -- they wanted to try and take it nationwide," said Glasper.

Community colleges had a very difficult year in 2020 and are still trying to figure out how to encourage many of the students who dropped out of college or delayed their attendance to come back, said Glasper. College completion is a central goal of the consortium, he said.

"Twenty twenty is being talked about as the 'lost generation' of community college students," said Glasper. "It might take us a period of five years or more to get back on track."

By offering classes from other institutions in the League, students can access educational opportunities that might not be offered at their home institution, said Glasper. They can also have increased flexibility.

From the college's perspective, sharing online courses allows institutions to use their resources much more efficiently, said Pierce. It can also provide support if an instructor suddenly becomes ill or an institution has difficulty hiring qualified individuals.

"The timing of this consortium is great," said Glasper. "It's an opportunity for us to see what impact course sharing might have in terms of enrollment and offering the flexibility that the colleges would like to have." ∎

https://www.insidehighered.com/news/2021/05/27/community-colleges-launch-consortium-share-online-classes

Innovation Priority:
Holistic Student Support

Education after high school is confusing and even intimidating for many of today's students, especially students who are the first in their family to attempt it. They have the talent; they just need a map. We invest in programs, technologies, and resources that provide information to help these students make the right choice for them and bring together the whole campus to support them on their path.

The Power of Positive Thinking

Faculty members who saw the shift to online learning as an opportunity were less likely to feel burned out or receive poor ratings on their teaching.

By Lindsay McKenzie // February 18, 2021

With little time to prepare or plan, many instructors found last year's COVID-19-induced transition to remote learning difficult. But some managed to weather the storm with a positive attitude and a willingness to learn new skills, according to a recent study.

These optimistic instructors were the ones who were better able to avoid burnout and ended up receiving stronger evaluations from their students.

The longitudinal study, conducted by researchers at the University of Augsburg and the University of Mannheim in Germany, was published in the journal *Computers in Human Behavior*. It examined the goals and attitudes of 80 faculty members in the semesters before and after the transition to remote instruction. The researchers also reviewed 703 student ratings of these faculty members' teaching quality.

Authors of the study were planning to look at faculty members' attitudes toward teaching prior to COVID-19, they said via email. But when the pandemic hit, "the context of the higher education landscape along with that of our study changed completely," said one of the study's authors, Raven Rinas. Rinas responded to questions in an email with replies put together with the

ROBERT NICKELSBERG/CONTRIBUTOR/GETTY IMAGES
New research draws connections between faculty attitudes and how well they took to online instruction amid the COVID-19 pandemic.

study's other authors, Martin Daumiller, Julia Hein, Stefan Janke, Oliver Dickhäuser and Markus Dresel.

The study continued to explore the motivation of faculty members but added exploring how they responded to the pandemic.

"We felt that gaining insights into how faculty members' motivations impacted their perceptions of and experiences during the pandemic could be a catalyst for further research, with the ultimate goal of identifying those who are struggling and better supporting them," Rinas said.

Much like in the U.S., universities in Germany transferred from face-to-face to remote teaching in March 2020. For many faculty members, it was their first time teaching online,

and there was little time to prepare for this new modality and learn how to approach it effectively. Though administrators did their best to support faculty members, many found the experience stressful, the study authors said. German universities are still primarily teaching remotely, and it is expected this will continue into the upcoming summer semester, though things are "still relatively uncertain at this point," Rinas said.

Survey results showed that faculty attitudes toward the change from face-to-face to online teaching were generally more favorable than unfavorable, but responses varied widely. The study found that instructors who indicated a lack of willingness to learn new skills, embrace new technology or improve their teaching before the COVID-19 outbreak

The Power of Positive Thinking (cont.)

reported a higher perceived threat from the shift to remote learning. These instructors also experienced higher burnout levels and more negative student evaluations.

The authors were pleased with the responses from 80 faculty members, especially considering how busy they were. But they would have liked input from a larger sample.

"We are also aware that faculty members who were more distressed may have been less likely to respond to our survey in the first place, meaning that the results in our study likely depict more conservative estimates," Rinas said.

"A key takeaway message from our research is that also personal, especially motivational factors of

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faculty members are important to consider (particularly their goals and attitudes towards unexpected challenges)," Rinas said. "Dealing with unexpected challenges is and will continue to be an issue that has important implications for university faculty members' well-being, professional learning and teaching quality." ∎

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Making Geology Accessible for Blind Students

Finding few resources to support a blind student studying geosciences, a professor at the University of Kentucky found a way to create a library of tactile graphics so that others might make their classes more accessible.

By Lindsay McKenzie // April 22, 2021

When Sydney Clark, who is blind, enrolled in a geosciences class at the University of Kentucky in 2017, her professor realized the course was stacked with accessibility barriers.

In the geosciences, colorful maps, diagrams, graphs and photographs play an important role in conveying information and helping students understand new concepts, said Kent Ratajeski, senior lecturer in earth and environmental sciences. While some textbooks are compatible with screen readers for students who are visually impaired, even the accessible materials do a poor job describing complex images. It can be difficult to convey the movement of tectonic plates, explain glacial drift or describe the significance of different layers of sedimentary rock using words alone, said Ratajeski.

Knowing that geology is a very visual subject, Clark was concerned. In the past she encountered instructors who did not know how to support her. In some cases, Clark was even advised by instructors that their classes might not be a good fit for her, despite the fact that legally, all classes should be made accessible to students with disabilities.

Ratajeski met with Clark to discuss how he could support her and find out more about how she learns best. The professor realized there were few ready-made tactile resources

PETE COMPARONI/UNIVERSITY OF KENTUCKY

Sydney Clark reviews some of the images from a new tactile graphics repository that aims to open up geosciences to students who are visually impaired.

for blind students studying geosciences and took matters into his own hands -- creating models and tactile course materials that Clark could feel with her fingertips.

After Clark graduated in 2017, Ratajeski continued that work -- creating a digital repository of tactile graphics for other students and professors to print out and use in their classes.

Tactile Graphics

Learning through touch is very important to Clark, now 25, who started learning Braille when she was 5 and became almost completely blind when she was a teenager. Throughout her K-12 education, a

staff member created tactile graphics for Clark with diagrams and pictures annotated in Braille. She didn't find that same type of support in higher education.

"I was always used to having tactile graphics there," Clark said. "When I went to college, Braille was not a thing, really."

When she enrolled in the University of Kentucky, there was a Braille printer in the Disability Resource Center, but staff weren't sure how to use it, Clark said. Eventually, Clark became so familiar with the office that she would come and go to use the equipment without supervision.

As a public health major, Clark was

required to take multiple classes in science and math. She found supportive professors and a good variety of tactile course materials in her biology and anatomy classes. But in the geosciences, there were very few accessible materials readily available.

Though she could ask someone to describe an image to her, a person with vision doesn't necessarily know all the important pieces of an image to describe, Clark said.

"There can be a breakdown in communication sometimes," Clark said. "Having that tactile image there really helps get everything across that needs to be understood."

In literature searches, Ratajeski found very few articles in the geosciences describing best practices for teaching visually impaired students. The few articles he did find focused very much on the importance of creating models with textured surfaces that students can hold and explore with their hands. In response, Ratajeski started creating tactile collages and models out of clay, fabric, polystyrene foam and wax in his basement and then bringing them into class for Clark.

"I probably went a bit overboard," said Ratajeski.

Clark didn't often encounter instructors willing to go that extra mile. But when she did, she said it made her experience of the class much richer and encouraged her to work harder.

"He would go to Hobby Lobby and different craft stores and make me models of volcanoes out of clay," Clark said.

> " There can be a breakdown in communication sometimes. Having that tactile image there really helps get everything across that needs to be understood. "

As the semester progressed, Ratajeski learned that there are printers that can create tactile graphics using heat-activated capsule paper. He started to draw his own graphics and print them at the Disability Resource Center. On one of his trips to the center before class to print out new materials, it occurred to Ratajeski that instead of creating his own drawings, having a library of ready-made tactile graphics would be a very useful resource for instructors across the geosciences.

Kent Ratajeski draws a template for a textile graphic on a tablet. Source: Pete Comparoni/University of Kentucky"When I looked at what resources are out there, I just didn't find too many," Ratajeski said. "There are some tactile image libraries online, but boy, nothing much there for geology. There was a lot of biology, and some science and chemistry, but geosciences seemed to be very underrepresented."

Through his research, Ratajeski found there are a total of six geology-related images in the Tactile Graphic Image Library housed at the American Printing House for the Blind. There are 140 images for biology, 76 for astronomy, 76 for physics and 68 for chemistry. At the Tactile Library, which is a resource primarily aimed at K-12 students, there is a similar underrepresentation of geosciences, he said.

Securing Funding

Ratajeski has not taught another visually impaired student since Clark, who has since completed a master's degree and now works as an epidemiologist. But he did not let go of the idea that a repository of ready-made tactile graphics would be a useful resource for other instructors.

Clark finished Ratajeski's class with top grades, and the professor was convinced that more visually impaired students would consider studying geosciences if they knew sufficient resources would be available for them.

Searching for grant funding to support the creation of the repository was challenging, said Ratajeski. It wasn't clear who would fund this kind of work. After more than a

Making Geology Accessible for Blind Students (cont.)

year of searching and applying for grants, mostly from charitable foundations, without success, Ratajeski followed a recommendation from a colleague in the university's Office of Philanthropy. He secured a $5,000 community grant from the American Geophysical Union in September 2019.

The repository of tactile graphics was published this January. Jack Reed, a software engineer who works in Stanford University's libraries, assisted with web development. Donna Lee, clinical associate professor and visual impairment program faculty chair in the University of Kentucky's College of Education, offered her expertise in Braille and tactile graphic design. Lee's students served as editors for the project, making sure the graphics are fully accessible. Clark served as a consultant.

The images are offered in three formats, Lee said: one with text annotations, one with Braille and one without any annotation so that students or instructors can add their own labels. To print the images, instructors will need access to a printer such as a Picture in a Flash tactile graphic maker. PIAF printers use heat on special paper that swells where there is black ink, creating a textured surface.

Printing a tactile graphic using a PIAF printer. Source: Amanda Nelson/University of Kentucky

The printers are a worthy investment for a higher education institution and widely used in education settings, Lee said. A PIAF printer costs around $1,400, with paper ranging from around $1 per sheet to $2.50 per sheet for larger formats. Printing using the devices is quick and easy, though some care has to be taken to ensure that an image is tactually readable.

"It's not as simple as just raising a few lines," Lee said. Texture and the size of the materials are very important, since fingertips cannot distinguish between very fine details easily, she said.

Lee and her students also had to consider that in the geosciences, certain patterns on diagrams and maps can be symbolic. A tactile graphic using a particular texture may be very important for conveying information in the geosciences, she said. A wavy line, for example, might represent the anticline and syncline of rock folds. The movement of tectonic plates might be indicated in diagonal lines moving in different directions.

The repository is now published on the website of the International As-

sociation for Geoscience Diversity, a nonprofit organization that aims to improve access and inclusion in the geosciences for people with disabilities.

So far, more than 80 black-and-white vector graphics have been shared in the repository, covering common themes and topics in introductory geosciences courses at the high school and college levels. Ratajeski plans to keep adding to the repository over time and encourages other instructors to create similar resources.

Though Ratajeski has taught just one blind student, he does not regret any of the time or effort he spent creating tactile resources. The next time a student who is visually impaired joins his class, he'll be ready -- and he can signal to incoming students that his class will be accessible to them.

Clark knew geology courses were visually geared when she signed up for Ratajeski's class four years ago. So she expected to have to navigate issues. But knowing resources exist can open up the subject for blind students in the future, she said.

"If I had known there was a resource like this repository, I wouldn't have hesitated," she said. "It opens up a lot of doors." ∎

Let's Make This the 'Year of Stackability'

To educate adult learners successfully, short-term credentials must build toward degrees, Paul Freedman and Paul LeBlanc argue.

By Paul Freedman and Paul LeBlanc // June 11, 2021

The future of education is stackable -- and that future needs to start now.

Our country faces a long path to recovery from the COVID-19 pandemic. One component that will be essential to an equitable recovery is a rapid acceleration of upskilling for a population of adults that was deeply disrupted by the pandemic. That is accelerating the demand for short-form programs.

At the same time, there is a segment of the education community that rightly argues that the data show that short-form certificates shortchange America's learners, particularly compared to the virtues and benefits of college degrees.

There should not be a choice, however, between short-form credentials and degrees. Credentials should build toward degrees, which is why the future of education should be stackable: it's the answer that allows learners to land meaningful jobs now while moving toward a degree.

The Demand for Shorter Programs

Adults are voting with their feet.

The research shows that people want short-form programs that are laser-focused on skills and will help them in the workplace as quickly as possible.

Many either can't afford full degree programs or don't have the luxury of waiting for the deferred payoff that comes after two or more years of study. Even at public colleges, the average sticker price has soared from 5 percent of the median family income in the 1980s to 16 percent in 2012. After accounting for all the forms of aid and the average price students and families actually pay as well as inflation, the price of college has roughly doubled from the late 1980s to today.

The outcomes are also highly uncertain -- with six-year graduation rates from four-year colleges for the lowest-income Americans hovering around 10 percent. Although we have improved graduation rates for the top three quartiles of Americans in terms of income, the bottom quartile has not budged over the last 40 years.

Taking out debt to enroll in college without earning a degree and benefiting from the earnings lift can be crushing for students' future life prospects. Nearly 40 million Americans have some credits, no degree and debt -- the dismal triple-header that is usually worse than not attending at all.

For a fast-changing workforce, incorporating short-form learning programs -- anywhere from a few

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weeks to a few months in length -- in federal financial aid programs is an answer to this challenge to fill a skills gap that will hinder growth and hold people back.

Forward-thinking companies should also find ways to leverage short-form programs. About 80 percent of the 50 million Americans who saw their jobs disrupted by the COVID-19 pandemic are low-wage workers without a college degree. This is a group whose jobs have changed dramatically or disappeared altogether and for whom upskilling and education are essential.

There is another group, though: those not yet affected.

Changes in technology didn't start in 2020, they just accelerated. Top executives recognize this: a McKinsey survey of executives found that 87 percent of companies already have or expect a major skills gap in the future.

We now live in a world where the pace of change in work and skills is ferociously fast -- even if you do not change your job, your job will change out from under you every three to five years. Even those who have jobs will be going in and out of a learning ecosystem to reskill and upskill. Short-form programs, not full degree offerings, will be what they need.

In Defense of Degrees

A central challenge, however, is that the data around short-form programs aren't all that great. Reservations about including them in federal financial aid programs make sense.

What's more, the data around degrees remain strong.

Families led by someone with a college degree have a median income that is over 70 percent higher than those without. That premium has expanded significantly in the past three decades, as the knowledge economy has gradually replaced the industrial one, including a rise of 10 percentage points compared to 10 years earlier.

Although there are signs that the degree's monopoly might abate, it hasn't yet. Not by a long shot.

Or, as we often say, people who believe college degrees are no longer necessary are those who already have one. Those who don't have a degree know its continued importance.

Large employers that consider skills in lieu of degrees -- companies like Google and IBM -- remain a minority. In most companies, good,

"

There should not be a choice, however, between short-form credentials and degrees. Credentials should build toward degrees, which is why the future of education should be stackable: it's the answer that allows learners to land meaningful jobs now while moving toward a degree.

"

stable jobs require college degrees.

Even as short-form certificates may be good at helping individuals build baseline skills to be useful in jobs now, they don't prepare learners with the foundation needed to continue to progress in their career and tackle more complex problems. For example, coding boot camps are known for helping students learn to do basic coding and web development, but they do not teach the theory of computer science necessary to think critically and frame more challenging problems. That's where degrees should shine.

The Stackability Imperative

Given the need for programs that rapidly upskill individuals for whom a degree is too long, too uncertain and too costly, and yet the challenge that degrees have clear advantages, what's the solution?

Research suggests an answer.

In a recent working report for the Community College Research Center, Thomas Bailey and Clive R. Belfield showed that, on average, cer-

tificates have a meaningful return, but with some caveats.

Two caveats were that the positive returns lasted only a few years and that because the value from certificates was relatively short term, it was important to use them to acquire additional credentials. The additional credentials that held value were typically assets like a traditional bachelor's degree, not other certificates.

This conclusion shows why the false choice is in thinking it's an either-or when it comes to short-form credentials and degrees.

Our country -- employers and hiring managers, policy makers and educational institutions -- must embrace the potential of short-form programs not just for their immediate utility, but also as a gateway for learners to earn a degree. Requiring that these credentials connect to a degree can mitigate against their downsides.

We can create more equity when we allow people to travel down the pathway to a degree at a speed

Let's Make This the 'Year of Stackability' (cont.)

that makes sense for them, at various levels of granularity in terms of time and the amount of learning, and in ways that provide more opportunity along the way.

For many students, being able to earn while they learn is the key to eventually completing a degree. In that spirit, short-form programs must function not as dead ends but as on-ramps to eventual degrees and a better life.

That's why the future is stackable. Short-form programs are here to stay, and they must build on each other so that shorter chunks of learning are able to count for college credit and allow learners to stack credits upon each other to form a degree.

Embracing this doesn't just help with a short-term imperative about adding skills to our workforce. It eliminates the either-or distinction and the potential downsides to short-form credentials that give adult learners pause.

An increasing number of programs are rising to this reality.

Programs like Pathstream offer digital skills certifications like Facebook digital marketing and Salesforce administrator, but that also stack into a degree. Grow With Google now offers college credit with the first of its short-form certificate programs. Salesforce's free Trailhead programs now have a credit option through Southern New Hampshire University. Universities like BYU-Pathway Worldwide are charting pathways of stackable credentials that lead to a degree.

In short, there's no reason to make students choose between short-form certificates and long-form degrees and many reasons to avoid forcing this choice on them.

Rather than making 2021 another year of the MOOC or coding boot camps, government officials and higher education leaders should commit to making this the year of stackability for the broader benefit of the people who need it most -- adult learners, and our society. ∎

Bio | *Terry O'Banion is senior professor of practice at Kansas State University and president emeritus of the League for Innovation in the Community College. Cindy L. Miles is also a professor of practice at Kansas State University and chancellor emerita at Grossmont-Cuyamaca Community College District.*

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How Higher Ed Can Win at Tech Offense and Defense

> If we want to live in a world that is enhanced rather than oppressed by technology, we need to change its culture from one of opportunism to one in the public interest, argues Francine Berman.

By **Francine Berman** // July 22, 2021

I have to admit that, like everyone else, I'm done with the pandemic. Last year, Zoom teaching and online social gatherings became more than old. When I got my vaccinations (thank you, science!), I fired Instacart. I've hungered for the long, in-person conversations over coffee that make deeper connections than tweets and TikTok videos.

Yet the internet saved my life in 2020 and early 2021. For myself and others, it was the only way to go to work, attend class or celebrate holidays with family on the other coast. It's hard to imagine how isolating the last year and a half would have been without today's information technologies. Over the last decade, and especially during the pandemic, these technologies have become critical infrastructure -- full participation in the world around us is almost impossible without using the internet. Yet with the benefits of cyberspace have come real and sometimes dangerous risks: unfettered behind-the-scenes personal data collection, mass surveillance, the rapid spread of misinformation, and data breaches rendering private and financial information open to the world.

How do we make technology good for us, promoting its benefits and minimizing its risks? The cyber-space each of us experiences is a fusion of tech innovation and social controls -- tech that provides mind-blowing capabilities and social controls that protect us by reducing misbehavior and exploitation. The same internet supports not only PornHub but also CDC.gov, Goodreads and Parler.com. Today's culture of tech opportunism has made cyberspace into a Wild West of misuse, manipulation, misinformation and radicalism -- dangerous enough that it must be regulated to ensure the well-being of all who depend on it.

If we want to live in a world that is enhanced, rather than oppressed, by technology, we need to change the culture of tech opportunism to a culture of tech in the public interest. That will require a shift in how we develop, use and oversee technology -- a reprioritization of public protections over private profits. It will require us to proactively educate current and next-generation students, citizens and leaders about the social impacts of technology. Changing culture is always a long, hard slog, but it's the only way to ensure that technology is ultimately good for society.

To change tech culture, we need to play tech offense and learn tech defense. Public servants and leaders play tech offense when they create
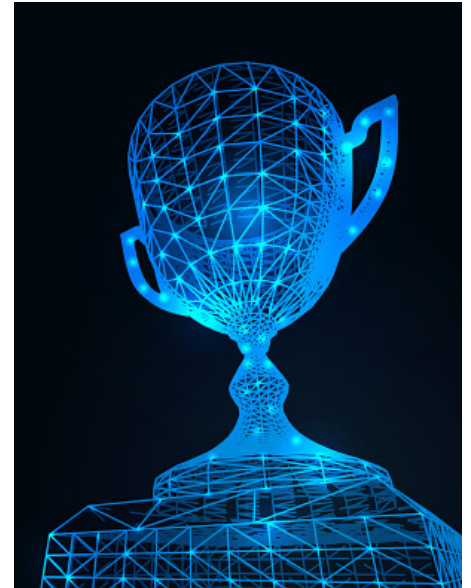
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and enforce laws, policy and practices that promote public protections: privacy, security, safety and the like. Culture begins to change when those protections are expected to be architected into current and next-generation products and services. Citizens employ tech defense when they understand the benefits and risks of the technologies they use and take steps to safeguard themselves and their information against exploitation, intrusion and worse. Like self-defense, tech defense provides a layer of protection and control between ourselves and the digital world.

Higher education can lay the groundwork for better tech offense and tech defense. Today's colleges

and universities are the last stop before many professional careers and should prepare current and future generations of professionals, public servants and citizens to live successfully in a tech-driven world. In the past, 20th-century higher education prepared us to create the powerful technologies of cyberspace; now 21st-century education must also prepare us to address the complexity, ethical dilemmas, social implications and need for protections in a digital world.

Public Interest Technology

Awareness about the social impacts of technology and strategies for tech defense and offense are the focus of the emerging field of public interest technology, or PIT. A PIT curriculum is more than just extra computer science courses. It is composed of interdisciplinary courses that explore the impacts of technology -- on personal freedom, on communities and on society -- with the purpose of developing the critical thinking needed to make informed choices.

For the last few years, I've taught a course called Data and Society -- a good example of a general education public interest technology course. The purpose of the course is to expose students to the real-world trade-offs inherent in today's technologies and help them develop critical thinking skills they can use as tech consumers, professionals and leaders. The course is continually adapted to reflect new social challenges and emerging technologies.

In 2020, we talked about facial recognition and its complexities: the

> **If we want to live in a world that is enhanced, rather than oppressed, by technology, we need to change the culture of tech opportunism to a culture of tech in the public interest.**

challenge of determining when surveillance is protective and when it is intrusive, and whether and what kinds of social controls might be necessary. Facial recognition database images are collected from everywhere -- Facebook, dating sites, driver's licenses and more -- and algorithmic identification is often inaccurate, especially for people of color. Knowing the benefits, risks and challenges in limiting this technology makes for good tech defense and better tech offense.

We also talked about tech-powered discrimination -- how algorithms become biased, how tech becomes unethical, how training sets and unsupervised learning can steer algorithms towards bad outcomes. We talked about how the tsunami of data collected on each of us actively determines what products and pricing we're offered, what information we're shown and what communities we're connected to. There is no "party line" in the course, no right answers. But the course is designed to help students develop tech defense skills for challenges

they confront every day: Does this tweet provide information or misinformation? Is it leading me to a particular conclusion? What will this app or service do with my data? How safe is it for me to buy a smart doorbell, connected insulin pump, self-driving car?

And students are hungry for this kind of course and the tech defense skills they offer. In recent years, we've seen a groundswell of interest for socially relevant courses and experiences that help students tie college curricula to the real world. Many institutions couple public interest technology courses with PIT clinics or internships that provide experiential learning with the socially messy, real-world political and economic environments in which decisions about tech often get made. Student experiences can vary from participation in a cybersecurity clinic at the Massachusetts Institute of Technology focused on cyberattack vulnerability assessments to a public interest technology lab at Harvard University that concentrates on justice, ac-

countability and equity. Currently, almost four dozen higher education institutions in New America's Public Interest Technology University Network are pioneering PIT clinics and internships. Their practicums prepare students to put tech defense into action.

Most important, students with a background in tech defense are poised to play tech offense and build better tech. Today's students will be next-generation public servants, professionals and entrepreneurs. A PIT background gives them the tools and knowledge they need to develop effective tech policy and regulations and to design products and choose services with public protections in mind.

Students are not the only ones who need exposure to public interest technology. As trusted institutions, colleges and universities also provide a resource for the broader community. PIT outreach activities can help alumni, executives, local communities and working public servants expand their knowledge base and skills about the digital world. Public interest technology lecture series, podcasts, short courses, boot camps and other university outreach efforts can help citizens better protect themselves and accelerate the changes we need in tech culture.

Most of us are happy to see 2020 in the rearview mirror. But the pandemic gave us a clear view of the crossroads at which we find ourselves: Will tech control us, or will we control tech? Can we prepare ourselves to thrive in today's digital world? Higher education can help point us in the right direction. By including public interest technology as part of a 21st-century education, we will better prepare students and citizens with the skills they need to prosper in a post-pandemic world. ∎

Bio | *Francine Berman is the Edward P. Hamilton Distinguished Professor of Computer Science at Rensselaer Polytechnic Institute and a faculty associate at the Berkman Klein Center for Internet and Society at Harvard University. As of Sept. 1, she will be director of public interest technology and the Stuart Rice Research Professor in the College of Information and Computer Sciences at the University of Massachusetts at Amherst.*

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It's Time to Open the Black Boxes

As remote testing becomes pervasive, colleges should ask some fundamental and wide-ranging questions, Jeremy Epstein and Christopher Kang write.

By Jeremy Epstein and Christopher Kang // November 3, 2021

Earlier this year, Dartmouth College's medical school charged 17 students with cheating on remote online exams. Three of the students were expelled. The accused protested their innocence, claiming the medical school's remote test administration, or RTA, system had falsely flagged their conduct. With their reputations and careers hanging in the balance, their fate came down to a dispute about the software. Eventually, a technical explanation emerged, showing how students' logged-in cellphones and tablets might have been accessing course notes while the exam was being administered. Dartmouth's administrators then dropped charges against all the students accused, reinstated the ones expelled and apologized.

The incident demonstrated that while RTA systems are entrusted with enormous power, the basis for their automated judgment can sometimes seem mysterious. In tech parlance, systems whose inner workings are not open for easy inspection are often called black boxes. Given that RTA systems have become pervasive, the challenges in deciphering how they work can present huge technical, social, ethical and, possibly, legal problems.

That said, teachers and administrators can hardly be faulted for moving to remote testing over the past year. The COVID pandemic required everyone to improvise. Suspending classes and bringing the entire global educational system to an indefinite halt was not an option. Moving to online learning environments, in tandem with remote test administration, was arguably the only viable choice.

From elementary schools to graduate and professional schools, teachers and administrators did their best to purchase and deploy remote testing software packages that featured accessible interfaces, efficiently processed test results and, yes, appropriately included tools to detect potential cheating. Integrity is essential in academe, and academic misconduct does occur.

The trend toward online learning that predated the pandemic, and the consequent growing reliance on RTA systems, highlights the urgent need for American (and likely global) educators to develop a comprehensive set of uniform principles to guide the development and use of remote testing software.

To that end, the U.S. Technology Policy Committee of the Association for Computing Machinery, the world's largest association of computing professionals, released a Statement on Principles for Secure Remote Test Administration. The committee, which we're privileged to represent here, believes that technologists, faculty and administrators, as well as the companies that develop these packages, need to more consciously consider issues of fairness, accuracy, data security and accessibility during development and implementation of RTA systems.

The question of how these systems detect academic misconduct -- including specifically how they monitor the gazes of test takers during exams, enable the test taker's microphone to listen for voices

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and access test takers' computers to flag potential cheating or test stealing -- have been among the most talked-about aspects of these technologies. The Technology Policy Committee's principles focus heavily on assuring the actual ability of these systems to detect misconduct and how developers' claims of accuracy in this regard might be verified.

In addition, however, we urge the college and university administrators who are responsible for procuring these systems to ask more fundamental and wide-ranging threshold questions that go beyond mere functionality. For example, to ensure equity, they should make sure that the costs of using RTA systems are not passed along to students and that any students asked to take exams via a remote system have sufficiently robust access to the internet. Administrators should verify that the RTA software can be used by students with disabilities who may need to

rely on accessibility software or other kinds of accommodations. The RTA data-retention policies should be clear and audited. And all these questions should be evaluated using uniform benchmarks and accepted certification procedures -- two things that do not exist today.

As with any technology that monitors people's activities, especially on their personal computers, the statement also discusses and outlines principles to protect student privacy and data security.

Some people might argue that, as the pandemic wanes and students continue to return to the classroom, these concerns will fade as remote test administration systems are shelved. But the forecasted economic reality is that, given the cost and convenience advantages they offer educators and students, online learning platforms coupled with RTA systems will only become more pervasive in a post-COVID world. If such analyses are

correct, the pandemic will simply have accelerated the digital trend in education that was already well underway.

That is not to say that classroom learning is going away anytime soon. After all, technology has its limits, and many studies have shown that in-person education yields better outcomes than digital alternatives. For the foreseeable future, students around the world will attend in-person classes for their instruction and take exams with proctors looking over their shoulders.

But with what we've learned about RTA systems in the past year, and recognizing their growing role in the education ecosystem, the window in which to establish important principles about their use is closing. Such principles will help maximize their benefits to higher education institutions and students while minimizing their now all-too-evident and profound risks. ∎

Bio | *Jeremy Epstein is chair of the Association for Computing Machinery's U.S. Technology Policy Committee. Christopher Kang is a student at the University of Washington and led the working group that produced the committee's remote test administration statement.*

'The Great Upheaval' and the Coming Learner-/Learning-Centered University

❚ Looking backward, sideways and ahead.

By Joshua Kim // March 22, 2022

The Great Upheaval: Higher Education's Past, Present, and Uncertain Future **by Arthur Levine and Scott J. Van Pelt**

Published in September 2021

Beware of allowing online learning evangelists into your traditional, residential and research-intensive institution. Online learning people, it turns out, are hatching a secret plot.

This secret evil plan has three phases:

Phase 1: Initiate a smattering of online education programs (degree and nondegree), starting outside the core of the residential undergraduate program in graduate and professional schools.

Phase 2: To develop these new online programs, prioritize the recruitment of experts in learning science, such as instructional designers and other nonfaculty educators, who collaborate closely with faculty on online course and program development.

Phase 3: Apply the same research-based learning science principles and faculty/nonfaculty collaborations utilized in online programs to residential teaching and learning, focusing first on larger enrollment gateway and other introductory courses.

In this conspiracy, online education is a means to an end of institutional transformation. That transformation is to shift traditional residential education from teacher- to learner-centric and to put learning science at the core of instructional practices.

Creating new online education programs at traditional, residential, research-intensive institutions is a good lever for academic transformation, but it is not enough. What is most important is to gain traction in the campus marketplace of ideas.

The humans who work at our universities need to believe in the necessity of transformation and the efficacy of placing learning and learning science at the heart of change.

This is where Levine and Van Pelt's *The Great Upheaval* comes in.

Neil Gaiman once said, "A book is a dream that you hold in your hand." *The Great Upheaval* is a dream of a different sort of university.

The future of the university that Levine and Pelt envision is one where:

- "Higher education will be based on learning and outcomes."

- "Assessment will become largely formative, real time, and individualized …"

And my favorite quote from the book:
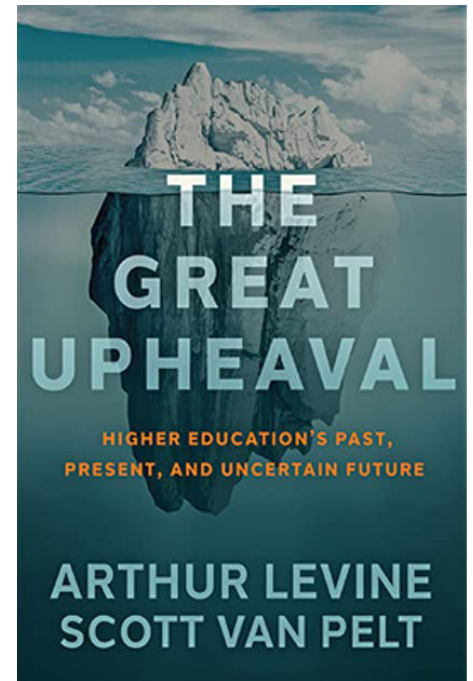
- "The higher education faculty … will be diversified to include learning designers, instructors, assessors, technologists, and researchers." (page 232–233)

The Great Upheaval provides a road map for those institutions wishing to proactively chart their long-term paths to designing the university of the 21st century. The authors create this map by using the effective technique of looking backward, sideways and forward.

The backward view contextualizes the future transformation of higher education in past large-scale changes. Learning the history of how our postsecondary system evolved is necessary to assure us that large-

scale change is possible and to remind us of the pitfalls that lie ahead.

The sections of *The Great Upheaval* that I most enjoyed were those on looking sideways. Chapters on the transformation of the music, film and newspaper industries provide insights into what the higher education industry will likely look like in the decades to come.

The impossibility of resisting the shift from analog to digital becomes clear from these sideways glances. Incumbents will use every mechanism available to avoid changing what has always worked, ranging from denial to lawsuits. The end result still ends up being a change from records to streaming, paper circulation to apps and theaters to digital platforms.

Levine and Van Pelt are convinced that higher education will become digitized, a process that will both supplant and support existing analog (residential, face-to-face) programs. Smart institutions will find ways to have digital learning com-

> " The sections of The Great Upheaval that I most enjoyed were those on looking sideways. Chapters on the transformation of the music, film and newspaper industries provide insights into what the higher education industry will likely look like in the decades to come. "

plement campus programs to provide more choice for learners *and* greater resiliency for colleges and universities.

The Great Upheaval joins a chorus of book-length arguments (many published by Johns Hopkins University Press, including my own co-authored book with Eddie Maloney *Learning Innovation and the Future of Higher Education*) to situate learning and the learner at the center of university design and institutional strategy.

Coming out of the pandemic (hopefully), the time is now to have wide-ranging campus conversations about the future of our institutions.

An ideal way to generate smart campus discussions—ones that avoid the traps of ahistoricism or faddish techno-boosterism (no, VR will not "revolutionize higher ed") is to book club with the right book.

The Great Upheaval is that right book. ∎

Bio | **Joshua Kim** *is the Director of Online Programs and Strategy at the Dartmouth Center for the Advancement of Learning (DCAL) and a CNDLS Senior Fellow for Academic Transformation, Learning, and Design at Georgetown University. He has a Ph.D. in demography and sociology from Brown University.*

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Who Are the Students Struggling With Online Learning?

A new survey sheds light on the current digital divide in higher education -- and what faculty can do about it in their classrooms, writes Nicole Barbaro.

By Nicole Barbaro // September 29, 2021

I'll be honest with you: I don't often use a lot of tech in my courses.

Of course, I use standard education technology, such as learning management systems, audiovisual tech aids and some basic design software to spice up my content -- staples of the 21st-century professor. But I don't often seek out the latest apps, the newest tech or the most innovative tools, and I worry about equitable access to them for my students.

I am always fashionably late to the ed-tech party. And when I do eventually arrive, I often struggle to get the most out of the latest technologies. Although I know ed tech is useful, it can be difficult to learn to use it.

And I am not alone. Students have also floundered, perhaps just as much as professors, when trying to use of all the new educational technology that became the new normal of online learning during the COVID pandemic. In fact, a new report I led from the College Innovation Network finds 20 percent of students reported they struggled to learn how to use ed tech in their courses this past year, and 33 percent said keeping up with how to use new technology has been hard.

The published report, "The New Digital Divide: How EdTech Self-Efficacy is Shaping the Online Student Learning Experience in Higher Ed," shares results from nearly 700 students across four different higher education institutions, including a primarily online university, a public university, a private university and a community college. The main message from this report is that students' confidence in their ability to learn and adapt to new technology in the classroom -- or "edtech self-efficacy," as coined in the report -- is an important correlate of nearly all aspects of students' learning experiences that we asked about in the survey. As one student reported, "The programs for some classes were very difficult to navigate. I would've really preferred the chance to learn how to use the program face-to-face. Emailing and then waiting up to 48 hours [for a response] could really put a strain on my homework schedule."

And although many students found ed tech easy enough to navigate, some noticed their peers struggling throughout the year. "Although using such technology was easy for me, that same ease did not extend to every student," another student shared.

Most conversations on ed tech over the course of the last year have centered on issues of the access to it that students need to participate in their courses. And while access remains an ongoing issue in high-

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er education, as the CIN data also show, the take-home of the report is that equity is more than just access. Students' variable experiences with technology and their ability to fully use it to get the most out of their learning matters, as well.

In the report, we looked at students' reports of their ed-tech self-efficacy and how that related to other aspects of their online learning experiences. We found that ed-tech self-efficacy was the most important correlate of all other facets of their learning during the pandemic. Students who reported greater ed-tech self-efficacy were also significantly more likely to say that ed tech enhanced their learning experiences throughout the year, that they learned effectively online, and that they felt prepared for this upcoming academic year.

Meanwhile, students who reported struggling with how to use ed tech in their online courses were also significantly more likely to comment that using it felt invasive and that they would consider not enrolling this year if their courses were fully online. Those students also were much less likely to report that ed tech improved their learning across the academic year.

Our survey highlights that the implicit assumption in the ed-tech and higher education spaces that students today are "digital natives" -- and that introducing new tech is a nonissue for students -- is flawed. While that assumption may be true for many students, continuing to operate under it could result in us leaving about a quarter of all our students behind.

A lot goes into faculty course preparations, and you have almost too many aspects to consider when designing an inclusive learning community in your classroom. Once you choose the right ed tech for your course, what can you do to ensure students are getting the most out of their experiences?

- **Acknowledge the dual learning of not only content but also new ed tech.** It's important to realize that the introduction of new technology results in a dual learning experience for students. Learning how to use that technology will certainly be useful to students in other courses and their future careers. But you should design your classes to incorporate proper instruction of new technologies for students and ensure they all have the knowledge they need to fully participate and succeed in the course.

- **Ask students about their prior experiences with ed tech the first day of class.** On day one of my course, I always give a "get to know you" survey to my students to fill out in class and return before they leave. I often ask about their major, their goals and other interesting information to help me get to know who I am teaching for the semester. This year, I'll also be asking about ed tech. How confident do they feel about using it? Do they have access to a computer, printer and reliable Wi-Fi? Rather than waiting for issues to arise later in the semester, work with students from the get-go to ensure they can fully participate in the course you planned.

- **Know what other tech that the tools you require depend on to function.** Many ed-tech products rely on computers rather than mobile phones to operate well, or they demand regular and reliable access to Wi-Fi to participate in asynchronous courses, for example. Without addressing the inequities among different students' access to basic technology, adding new ed tech could exacerbate those inequities. When prepping a course, faculty can adopt technology that aligns with their student populations. When I taught at a research university, access to computers was not an issue. When I taught at a community college, however, students struggled to log on to the learning management system to read announcements, and not a single student had a computer in class. You should make contingency plans for students without access to technology and work collaboratively with them to ensure they can fully participate in learning.

While issues of access to technology will remain a long-term issue across the higher education sector, understanding that the digital divide extends beyond that can change how we design courses and work with students in important ways. Although individual faculty members can't resolve issues of access for all students, they can address the learning experience in their own classrooms. ∎

Bio | *Nicole Barbaro is an educational research scientist at WGU Labs, an adjunct professor of psychology at Utah Valley University and the communications officer for the Human Behavior and Evolution Society.*

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Engaging Learners for Relevancy and Retention

Too often we assess our own learning by how pleasant the learning experience is, rather than assessing retention as well as how authentically relevantly and meaningfully those experiences and outcomes apply to real-life situations.

By Ray Schroeder // April 12, 2022

For nearly half of my faculty career, I taught mostly through a face-to-face lecture mode. Yes, I dabbled in simulations and games in some classes, but for the most part, in the last century from 1971 through 1995, I did little to adapt my teaching to enable students to better achieve the most meaningful outcomes. For the most part, those students were able to succeed even though I was using one of the least effective modes of teaching—oral delivery, supplemented by whiteboard. This mode required students to become auditors, transcribing what I shared and translating it into their personal context of background and applicability to their career aspirations.

It is certainly true that many of us enjoy well-formed and responsive lectures that relate well to the audience. They can be great entertainment, as well as fact-filled. It is the fine art of the sage on the stage. Yet this approach has not been proven to be the very best in building retention. As professor emeritus of communication, I know that engaging learners in active learning is superior in retention of knowledge and in applying knowledge to a wider variety of situations.

Learning by doing or simulations—especially through teaching others—has been shown to elicit better retention than merely describing a concept or action. The learning pyramid, sometimes referred to as the "cone of learning," developed by the National Training Laboratory, suggests that most students only remember about 5 percent of what they hear in lectures and 10 percent from textbooks, but they retain nearly 90 percent of what they learn through teaching others!

"Active learning" is the term we most often apply to the foundational concepts of engaging learners in the process.

Active learning activities can involve such activities as role-playing, problem solving, polling, debates, group work, case studies and simulations. Certainly, many aspects of internships, apprenticeships and other on-the-job work can be effective active learning when supplemented with materials or mentorship.

This approach in most cases necessitates that the educators collaborate with the professionals in the field. It is in that nexus between professor and practitioner that is more critical than ever in our rapidly changing world where technologies are driving constant innovation and reinvention. We are called upon to teach for tomorrow in an environment where the rapid development of new products and practices are driven by the scaling of artificial intelligence and digital networking.

A whole host of benefits become immediately apparent when active learning is applied. Perhaps, most important, is that the learning process moves from a one-

Active learning is a pedagogical technique coined by professors Charles Bonwell and James Eison in their 1991 book Active Learning: Creating Excitement in the Classroom. Bonwell and Eison argued that teaching should be less about imparting information to students via lecture-based learning and more about developing skills, while also engaging students in higher-order thinking, whether by reading or writing about the task at hand or by discussing it. Active learning refers to teaching practices that give students opportunities to work with concepts over and over, in a variety of ways and with opportunities for immediate feedback, so that knowledge can take hold in their own minds. (Top Hat)

way "professing" by the instructor to a two-way engagement among the learners and the instructor. It is in this engagement that new ideas and topics emerge, not just from the person paid to teach the class, but also from the learners who bring important perspectives, expectations, ideas, and questions to the process. The Cornell Center for Teaching Innovation describes it this way:

A key aspect of active learning is the use of authentic assignments and assessments. The Indiana University Center for Innovative Teaching and Learning writes, "An authentic assignment is one that requires application of what students have learned to a new situation, and that demands judgment to determine what information and skills are rele-

Active learning methods ask students to engage in their learning by thinking, discussing, investigating, and creating. In class, students practice skills, solve problems, struggle with complex questions, make decisions, propose solutions, and explain ideas in their own words through writing and discussion. Timely feedback is critical to this learning process either from the instructor or peer feedback from fellow students. Education research shows that incorporating active learning strategies into university courses significantly enhances student learning experiences (Freeman et al., 2014; Theobald et al., 2020).

vant and how they should be used. Authentic assignments often focus on messy, complex real-world situations and their accompanying constraints; they can involve a real-world audience of stakeholders or 'clients' as well."

There are many great websites and online tools to assist in the development of authentic assignments and assessments. Professor John Mueller of North Central College maintains one of them, the Authentic Assessment Toolbox. ■

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