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Learning Science and Personalized Approach to Learning

At McGraw-Hill Education, we often describe what we do as “learning science” – but just what does that mean?

To us, learning science is the framework that helps us unlock the full potential of every student. It represents the intersection of psychology, the cognitive and neurosciences, educational research, instructional methods, implementation tools, and data analytics – harnessed in such a way that they push us to design approaches that are as effective as can possibly be for students, educators and educational institutions.

In other words, it’s about studying the learning process, identifying methods that can improve it, and then developing solutions that can bring those proven methods and insights to as many students and instructors as possible – ultimately helping students get maximum value out of their college investment by graduating on-time and workforce-ready.

Like any science, learning science is inherently rooted in research. As a company, we’re so serious about learning science research that we founded an independent advisory council staffed by leaders from the academy that is devoted to it: the McGraw-Hill Education Learning Science Research Council Advisory Board. The research that this council and its partners conduct serves as the foundation for virtually every new learning solution that we develop.

But even the best research can’t bring about change on its own – it’s what you do with it that counts. So just what have we done?

In short, we’re personalizing learning. By harnessing technology and applying what we know about learning science, we’ve designed and refined learning solutions – adaptive, personalized learning solutions – that empower instructors and institutions and give them tools and insights to support and enhance students’ learning experiences and, of course, to improve outcomes.

In fact, we’ve seen that students who use our adaptive learning solutions get better grades, complete their courses at higher rates, and graduate on time and in larger numbers. That’s real money saved for students and colleges, and real lives affected. And it’s a powerful use of technology that helps learners and teachers make the most of the learning moment.

Best of all, we’re just getting started. As research yields new findings, and as the science of learning continues to evolve and improve, so too will our personalized learning solutions.

I’m very proud of what we’ve achieved so far. But by working closely alongside educators and universities, I’m confident we can expand our impact even further – and help even more students reach their full potential.

Yours,

Mc Graw Hill Education

David Levin
CEO
McGraw-Hill Education

David Levin

Introduction

The centrality of teaching and learning to higher education – now and in previous generations – can give the impression that not much is changing. In fact, teaching and learning are undergoing substantial change – through technology, new approaches in the classroom and a greater emphasis on measuring student learning.

Adaptive learning, to take but one example, provides for personalized instruction and evaluation in ways that can encourage student success and speed time to graduation. Adaptive learning is but one of many new approaches that are transforming higher education. As those transformations take place, colleges are looking for new ways to assess those and other programs.

The articles in this compilation explore some of these shifts, and essays weigh in on key issues related to these changes. *Inside Higher Ed* will continue to cover these transformations in higher education. We welcome your reactions to this booklet and your thoughts on future coverage.

--The Editors
editor@insidehighered.com

News

A selection of articles by *Inside Higher Ed* reporters

Adaptive Learning for Advanced Math

By Scott Jaschik // January 23, 2017

UC Santa Cruz finds that follow-up to initial placement testing can move students toward higher level work.

Much of the buzz about adaptive learning focuses on its ability to help students who need remediation. But a program at the University of California, Santa Cruz, illustrates the potential for adaptive learning to help students at a competitive university reach advanced mathematics courses more speedily than they might have otherwise.

Like many colleges, Santa Cruz requires new undergraduates to take a mathematics placement test. For the last two years, the university has followed that up with an adaptive learning opportunity. Students were told where they would be placed based on the test alone -- and then had the chance to do adaptive work to get ahead. One of the theories behind adaptive learning is that many students need to brush up on some skills, and may not need an entire course to reach the next level.

The experience at Santa Cruz backs that theory. In the summer of 2015, 722 students used the adaptive program in mathematics, and 84 percent showed enough improvement that they were able to move up to higher level mathematics (typically moving from placement in college algebra to placement in pre-calculus or calculus). Then in the summer of 2016, 731 students participated and 88 percent qualified for higher level mathematics courses.

In an interview, Jaye Padgett, interim vice provost for student success at Santa Cruz, said the experience of being placed in a lower level course because of one or two weak areas can have a longterm impact

on a student.

"We often in the past put students into classes where they only needed some of the material" to be ready for a higher level course. "It can be really disheartening, very dispiriting to the students," Padgett added.

"And that undermines their success."

"We often in the past put students into classes where they only needed some of the material" to be ready for a higher level course. "It can be really disheartening, very dispiriting to the students. And that undermines their success."

Assessment and LEarning in Knowledge Spaces, or ALEKS. ALEKS uses artificial intelligence to assess what students know (and don't) and provide immediate, personalized instruction for each student.

ALEKS has its roots in the UC system, having been created by researchers at the University of California, Irvine – with support from the National Science Foundation. McGraw-Hill Education bought ALEKS in 2013. ■

https://www.insidehighered.com/digital-learning/article/2017/01/23/uc-santa-cruz-uses-adaptive-learning-encourage-students-take

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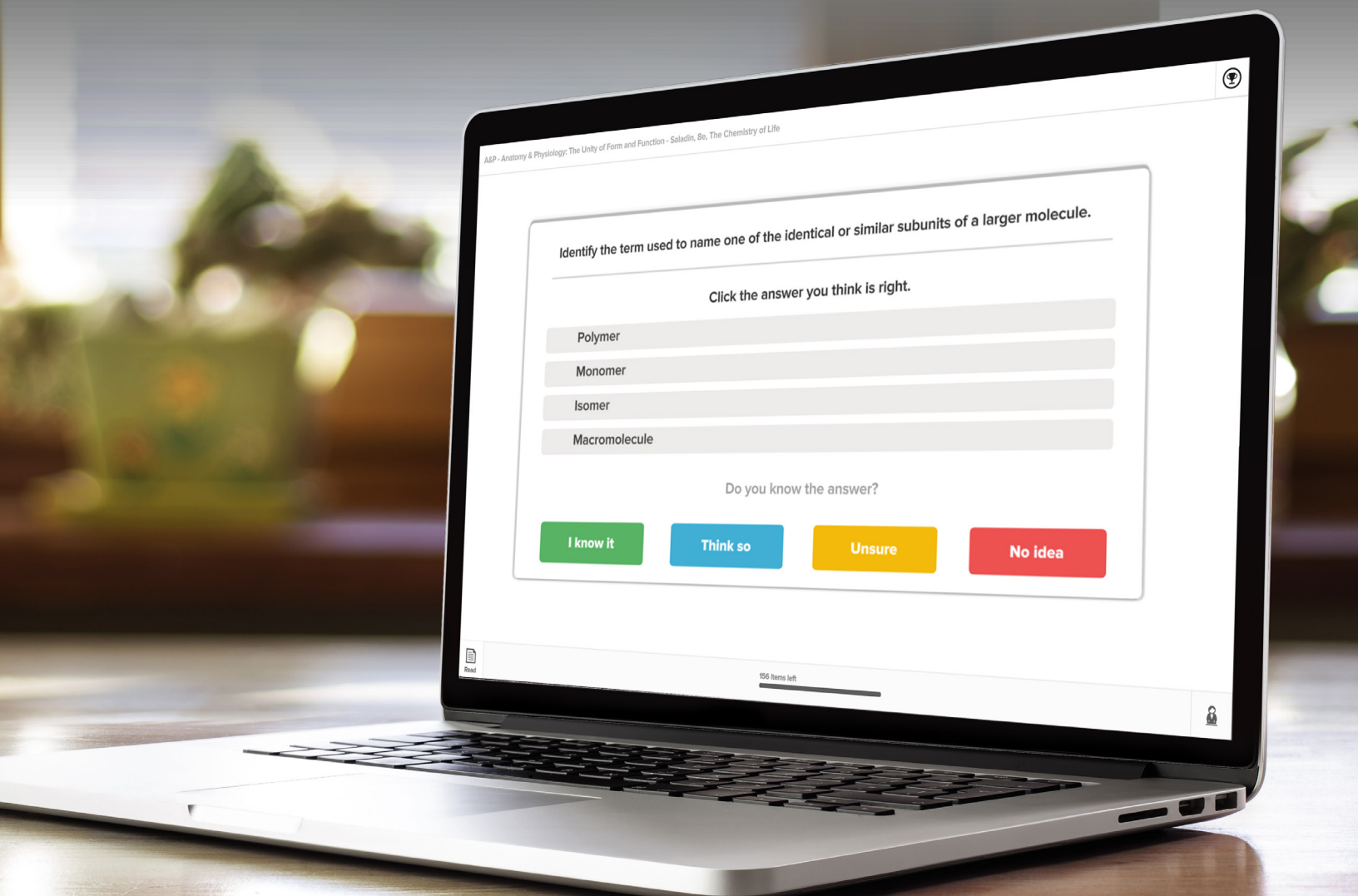

Going All In on Personalized Learning

By Paul Fain // August 1, 2017

A $20 million project from National University seeks to combine adaptive courseware, predictive analytics and competency-based learning with a goal of better serving adult students.

National University is working to create a personalized education platform that combines three of the buzziest innovations in higher education -- adaptive learning, competency-based learning and predictive analytics for student retention.

The California-based nonprofit university is spending $20 million on the four-year project, with a goal of using the new platform in 20 general education courses by next year. If successful, the university said the approach could apply to a broader swath of academic programs.

"How do we create a university that truly tries to adapt to the needs of its students?" said David Andrews, National's president. "We have to have a better model for serving adult students."

The urgency Andrews describes might seem surprising for a university that for decades has been structured with the nontraditional, working adult student in mind. The average age of its roughly 30,000 students is 32, and just 50 are of the first-time, full-time variety. A majority are women and a quarter are veterans of the U.S. military.

National, which has 28 campus locations in California, Nevada and Washington State, is considered a pioneer in online education. About 60 percent of students attend online. And the university was one of the first to allow students to enroll each month, rather than on a semester system.

But the monthly start format is no longer innovative, said Andrews, as a growing number of colleges have borrowed from the playbook of the University of Phoenix and other early entrants into the adult-serving market.

National's board brought in Andrews last year in part to lead the $20 million project. He previously was dean and professor at Johns Hopkins University's School of Education. He was also the founding dean of Ohio State University's College of Education and Human Ecology.

"I've tried just about every type of institution, with the exception of a community college," he said.

Several experts said National appears to be one of the first to try to incorporate adaptive, predictive analytics and competency-based approaches with the same courses.

Loosely defined, adaptive learning is a form of courseware that adjusts automatically to individual students' abilities and progress. Predictive analytics involves the use of data to help faculty members, advisers and students themselves stay on track, such as through triggering early-warning alerts when a student slips. Competency-based education

programs drop conventional grading and break courses and credits into competencies that must be mastered.

National said it is exploring other emerging forms of personalized learning as part of the project, including first-course screening assessments and microbadging.

In addition, the university last month created a research and development arm, dubbed the Precision Institute, which will lead the project and support faculty members to study its progress. The university will make that research publicly available.

"We will be bringing in research fellows from around the country," said Andrews. "We don't just want this to be benefiting National students."

More to Follow?

Phil Hill, an education technology consultant, said a key to whether the project succeeds is how well National grasps the challenges it's trying to overcome.

"There's a huge risk that you don't understand the problem," he said, referring to the challenge of designing academic programs around adult learners. Hill also wondered about National's heavy focus on technological solutions. "Will they truly learn and adjust as they go along?"

While Hill was skeptical, citing the many buzzwords National used in announcing the work, he said the experiment is worth watching. "It's definitely interesting. It's a relatively large university that appears to be going all in on personalized learning."

President David Andrews

Mark Milliron, the co-founder and chief learning officer at Civitas, which has partnered with the university, said few academic programs include the range of emerging technologies and approaches National is pursuing.

"Those innovations tend to be done in silos," he said, but he predicted that would change. "That's the next phase for a lot of people."

Milliron describes adaptive courseware and what Civitas does in somewhat similar terms. He said "pathway" analytics, like those Civitas offers, are designed to help students better devise a path to and through an academic program. Learning analytics are focused more on course work.

National's attempt to put all the pieces together won't be easy, Milliron said, particularly the competency-based part. That's because competency-based learning tends to require approval from accreditors and to challenge the typical faculty role. Financial aid accounting also can be a challenge for those programs.

"The traditional higher education system is set up to be semester based," he said. "That's how the infrastructure grew up."

Andrews agreed, adding that completion rates can be a challenge in competency-based programs, because of the flexibility they give students to progress through a program at their own pace.

The role of faculty members will be different in the pilot's initial batch of 20 general education courses, said Andrews. For one thing, participating instructors have been asked to find three to five sources of open educational resources for each "microcompetency."

Andrews is working on this himself, for competencies he will teach in the pilot. Instructors will track the efficacy of course material, adjusting it based on what they see.

"We think we can bend the price point" by using OER, he said. "We're trying to create as much variety in those choices as possible."

If National succeeds in creating a new iteration of its adult student-oriented degree programs, Hill said it won't be the first time the university has been on the leading edge.

"They were among the real innovators to meet diverse learning needs," he said. ■

https://www.insidehighered.com/news/2017/08/01/national-u-experiment-combines-multiple-pieces-personalized-learning

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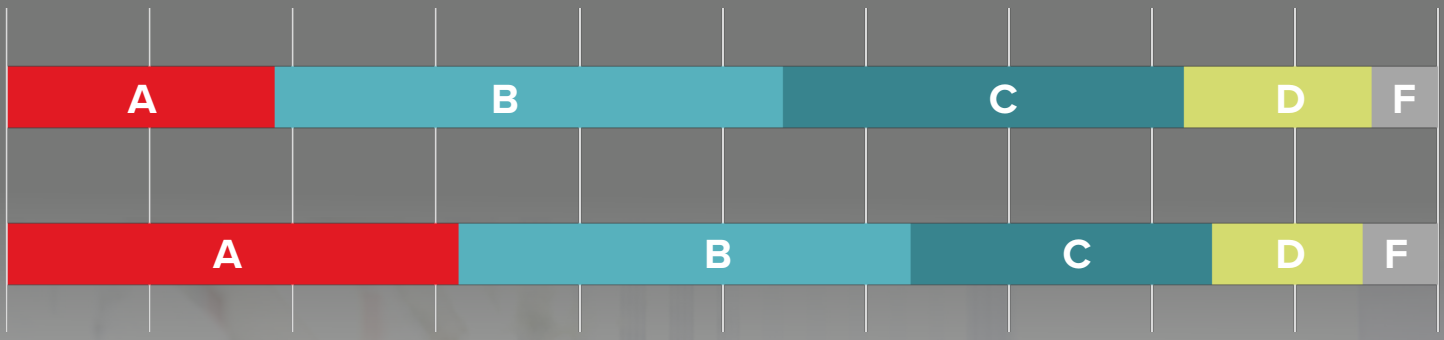

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Could Georgia Tech Use Online to Shave Time Off Bachelor's Degrees?

By Mark Lieberman // August 9, 2017

University uses model from closely observed master's in computer science on undergraduates for first time, finds notable success and sees path to shaving a year or more off in-person instruction.

Georgia Institute of Technology's online, MOOC-inspired master's degree in computer science has many educators watching closely. This spring, the university tried a similar approach for undergraduates and found it so successful that it's continuing along a path to shave off up to a year and a half of in-person instruction for students pursuing a bachelor's degree.

Fifty-nine students enrolled in the experimental Intro to Computing online course this spring, while approximately 350 students took the course in person. The university found no significant difference in grades or accumulated knowledge, based on test scores, between students in the two course models, according to a report compiled by the online course's instructor, David Joyner, a lecturer at Georgia Tech's College of Computing who also teaches several courses in the university's online computer science master's program.

In fact, test scores were slightly higher on average for the online students, though not to a statistically significant degree.

Adaptive Learning, Too

The spring online course also represented Georgia Tech's first foray into adaptive learning with software from McGraw-Hill that helped tailor exercises to students' performance in early lessons. Joyner credits that technology, among other factors, for helping students in the online class feel as satisfied as their counterparts in the classroom.

Components of the adaptive learning model like immediate feedback and flexible pacing were among the features of the class students praised most in their end-of-semester evaluations, Joyner said. It can be difficulty to fully gauge the impact of adaptive learning, though, given that it overlaps with the rest of the course.

"In many ways the adaptive learning is the reason why the course works," Joyner said. "Adaptive learning is one piece of the puzzle that can't really be taken apart."

Emboldened by the program's early success, another online section of the introductory computer science course will be available to all Georgia Tech undergraduates this fall, according to Joyner, who will be teaching the course once again. Officials told Inside Digital Learning that the fall course will be open to more than 100 students. Modifications from the spring version will include more complete testing suites; embedded personalized feedback and tutoring; integrated code visualizations and style feedback.

Joyner's course earned plaudits from Zvi Galil, dean of Georgia Tech's College of Computing, who has deemed the experiment a significant success. Galil intends, after consulting with his faculty members this fall, to bring more introductory computer science courses online over the next couple of years, eventually making it possible to shorten a computer science student's on-campus time by as much as 18 months.

"I expected it to be fine, but I didn't expect it to be this good," Galil told *Inside Digital Learning*. "[Joyner] did a fantastic job."

Galil maintains that the institution has no plans to establish a full online degree program in computer science; the residential college experience is too precious to sacrifice, he said. But he thinks the prospect of shaving a year off many students' college careers makes sense, particularly because more than half of Georgia Tech's students take longer than four years to graduate. He also wants the online undergraduate courses to be useful to other universities and companies.

The seeds of these efforts were planted in 2014, when Georgia Tech answered surging demand for master's degrees in computer science by teaming with Udacity to launch an online master's program that would be built on the model of massive open online courses while also charging tuition and having admissions standards. Because the virtual nature of the program allows many more students to take it than could attend classes on campus, the institution can offer highly competitive rates for a high-quality degree.

> "When you actually very thoughtfully look at the things you can do online and take advantage of what you can do online and can't do in person, I think it'd be an extremely productive model for most fields."

As of last year, the program hadn't matched the university's loftiest expectations. But after seeing strong enrollment and student satisfaction, the university announced earlier this year that it will add a similar online master's program in analytics this fall. The online computer science master's program now boasts more than 4,500 students and is expected to reach 5,500 this fall, according to a university spokesperson.

Meanwhile, this spring's pilot -- announced in November and run by edX with a learning platform from McGraw-Hill -- served to dip Georgia Tech's toe into the waters of MOOC-inspired online programs for undergraduates, drawing attention in higher education circles and among universities that rely heavily on local enrollment for their tech programs. Institutions have struggled thus far to translate the enthusiasm for their online master's programs to the undergraduate level.

In surveys at the end of the spring 2017 semester, computer science students in the online Georgia Tech pilot rated the course more highly than those in the classroom version, both independently and compared to other college courses.

Joyner's report also indicates that some online students with no prior computing experience showed greater improvement over the semester than traditional students with no prior experience. While that difference was not statistically significant, it did contradict the institution's hypothesis that students with prior experience would be better suited to the online program.

Joyner, also a Georgia Tech alum, volunteered to teach the class, quickly noting the differences between an online course for master's

students and one for undergraduates. He coordinated before the semester with colleagues who were to teach the course's classroom equivalent, but the actual rhythms of the two courses ended up diverging, with some lessons coming earlier online than in person, and vice versa.

"I wanted to make sure we gave more scaffolding, more feedback, more of a cadence that we could get into a routine with," Joyner said. "I figured we couldn't rely quite as much on self-starting students."

To his surprise, the class was much less "talkative" on discussion boards than he had expected, which meant at times that he wasn't sure how his students were progressing. He eventually realized that the built-in feedback in the online materials answered many of the questions students would otherwise have asked him.

Though their achievements were comparable, students' priorities differed between the course types, according to the report. Online learners reported on the end-of-semester survey that they placed high value on lectures and discussions, while traditional learners cared more about textbooks. The distinction is not as sharp as it appears, however -- the free, interactive textbooks in the traditional course also figured into the online lectures.

Online students also more emphatically valued homework assignments than their traditional counterparts, according to the report. According to Joyner, a few students took advantage of the real-time grade updates and purposely flunked a final exam because it wouldn't impact their final grade. Galil points out that this phenomenon isn't exclusive to online courses; students in classrooms also plot out their grades in similar ways.

For this fall's version, all 300 exercises will be outfitted with scripts that automatically grade students, providing increased rigor and protections against cheating, Joyner said, and more feedback will be available to students throughout the course. A style checker and a problem visualization tool are in the works as well.

Looking Ahead

Joyner is bullish on the idea of bringing online courses to the undergraduate level, because students at that age might be more comfortable with the hands-on nature of the online course experience than they would be with an impersonal 200-student lecture hall where no one notices when they're absent.

Computer science is particularly well suited to the online model, Joyner said, because most of the students' activities would be completed on a computer even in an on-campus setting. But it could work elsewhere, too, Joyner said.

"I think the fact that online education has been so inferior in so many places means that a lot of attention really has to be paid to doing it right," Joyner said. "When you actually very thoughtfully look at the things you can do online and take advantage of what you can do online and can't do in person, I think it'd be an extremely productive model for most fields."

Galil maintains that the institution has no plans to establish a full online degree program in computer science; the residential college experience is too precious to sacrifice, he said. But he thinks the prospect of shaving a year off many students' college careers makes sense, particularly because more than half of Georgia Tech's students take longer than four years to graduate. He also wants the online undergraduate courses to be useful to other universities and companies.

Georgia Tech is still years away from Galil's goal, and Galil is quick to acknowledge that it might not develop exactly as he now envisions it. The online option could also drive down tuition costs and expand opportunities for a greater number of students to enroll, Galil said.

"We are going into uncharted territory. [With the online master's program,] we jumped into the water and we learned to swim," Galil said. "We didn't know it would succeed, we committed to doing everything in our power to succeed." ■

https://www.insidehighered.com/digital-learning/article/2017/08/09/georgia-tech-plans-extension-undergraduate-online-computer

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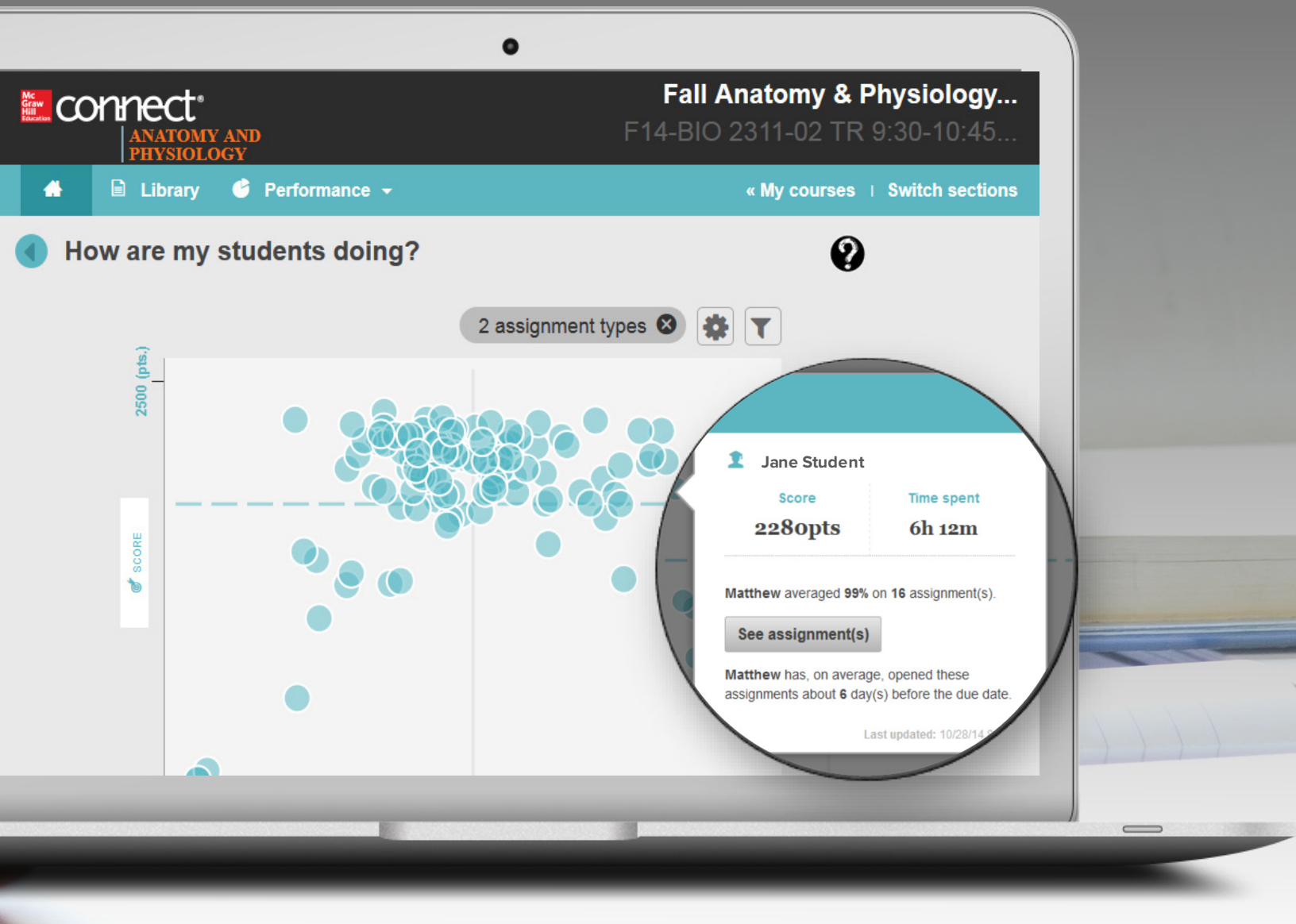


Indiana's Active-Learning Mosaic Expands

By Carl Straumsheim // May 12, 2017

The university brings its active-learning initiative to regional campuses, seeking to boost student engagement.

Indiana University's "active-learning" initiative is growing faster than expected, partly because of an approach that embraces different campus types, class sizes and classroom layouts. That approach is reflected in the initiative's name: Mosaic.

Many colleges offer development programs or incentives for faculty members to redesign lecture courses to feature more active learning, for example by having the instructor serve in a facilitating role as students work together on solving problems.

Some institutions are even betting on active learning as the teaching method of the future. The College of Medicine at the University of Vermont, for example, last year said it would do away with lecture courses completely.

IU is experimenting with active learning to boost student engagement in class. So far, the university has exceeded expectations, said Anastasia Morrone, associate vice president of learning technologies.

"We know that students who are engaged are having a better experience," Morrone said. "They're engaging with the materials in a deeper way. It's just more motivating for the students."

Mosaic launched in January 2016 at IU's Bloomington campus and expanded to the Indianapolis campus that fall. Last week, the university announced it would bring the initiative to five of its six regional campuses. After starting with 15 faculty fellows, the initiative now has more than 50, and the university plans to add about 50 more a year.

Morrone said Mosaic differs from active-learning projects at other universities because it is less strict when it comes to what an active-learning classroom should look like. The most high-tech rooms may include document cameras, microphones and video walls, but others

may simply feature whiteboards and wireless internet, she said.

All spaces designated as active-learning classrooms at IU still have three elements in common: they feature seating arrangements that allow students to work in smaller groups, encourage collaboration on whiteboards or monitors, and allow faculty members to move around the room.

Those requirements could make it easier for IU's regional campuses to adapt Mosaic to fit their needs, Morrone said. Indiana University East, where many students are enrolled in online degree-completion programs, will likely need fewer active-learning classrooms than the more residential Southeast campus, for example.

"Depending on the mission of the regional campuses, it's going to look a little different," she said, adding that IU chose to bring Mosaic to its regional campuses last fall in order to give the campuses more time to redesign classrooms.

The Bloomington and Indianapolis campuses each have about 30 spaces designated as Mosaic active-learning or "tech-enhanced" classrooms, according to a university database.

In addition to the efforts to redesign classrooms, Mosaic also includes a fellowship program open to all full-time faculty members. Those selected to participate are required to teach a course in one of the classrooms, attend an intensive one-day workshop and work with researchers and other fellows to test the spaces and improve active-learning techniques. They also receive a small stipend -- about $1,000.

"We can create these amazing new classrooms that don't look like anything the traditional classrooms that you and I may have had when we were undergraduates, but we can't just put faculty into those rooms and expect they know how to use them well," Morrone said.

Jill Robinson, a senior lecturer in the department of chemistry at the Bloomington campus, participated in the inaugural Mosaic cohort last spring. She taught a bioanalytical laboratory course in the campus' collaborative-learning studio (seen above), a high-ceilinged former swimming pool that Morrone described as "one of our most ambitious classroom renovation projects." The classroom now seats 96 people.

In an interview, Robinson said she has taught using active-learning techniques ever since receiving some "not too kind" midterm evaluations during her first semester of teaching 18 years ago. Since then, Robinson said she often splits up class sessions by introducing a concept during the first 10 to 20 minutes before letting groups of students apply that knowledge to a problem.

Robinson said that, while it has taken her four semesters, she now feels that she is using the classroom "in the right way," changing up the class sessions depending on the needs of the students and the technology at her disposal.

"One of my main improvements has been a larger use of collaborative activities and more variety in those activities," Robinson said. "I lecture a lot less. One day I'll use whiteboards. One day might be more focused on computer search. One day … I'll project students' screens to the video wall."

To participate in the program, faculty members also agree to "allow data collection as part of larger research studies," according to the application form. That data collection is fueling several research projects looking at the efficacy of active learning. Robinson, for example, is collaborating with two other faculty members at the Bloomington campus to study the use of teaching assistants in active-learning classrooms.

Since the first fellows began teaching courses in the active-learning classroom last year, those studies are still ongoing, Morrone said.

"We fully expect that those students [taught in active-learning classrooms] will learn more than students who have been taught in a more traditional model," Morrone said.

She stressed that it is important for the university to provide support to faculty members to investigate that hypothesis. "If we invest money and time, and faculty change their teaching practices to teach in these new manners, does it matter?" ■

https://www.insidehighered.com/news/2017/05/12/indiana-universitys-active-learning-initiative-expands-exceeds-expectations

More Writing Through Automation

By Carl Straumsheim // July 10, 2017

University of Michigan adds an automated text-analysis tool to a growing program intended to give more students a chance to learn through writing.

High-enrollment courses often lead professors to assign multiple-choice quizzes, as more complicated forms of assessment dramatically increase the time they take to grade. This fall, the University of Michigan at Ann Arbor will test whether automated text analysis can help professors integrate more writing into their courses without imposing significant new time constraints.

The automated text-analysis tool is the latest addition to M-Write, a program run by the Gayle Morris Sweetland Center for Writing at Michigan. The program targets students in large introductory science courses, using writing as a strategy to improve student learning. Michigan has funded M-Write with a $1.8 million grant, aiming to bring the program to 10,000 students by 2021.

M-Write combines automation with human oversight to lead students through writing assignments in which they draft, receive peer feedback, revise and resubmit. In addition to the new text-analysis tool, the program already uses automation for tasks such as peer review -- a student's essay is sent to three classmates for anonymous feedback -- but oversees the process with writing fellows, former students who excelled in the class.

In interviews with *Inside Higher Ed*, members of the M-Write team said the addition of an automated text-analysis tool is an effort to create a "feedback loop" within the program, giving students and faculty members the kind of personalized insight they both would gain from a face-to-face conference.

"What you'd like to do is sit down and read a paper with the student in front of you, identify a misconception and have a conversation about it with them," said Ginger Shultz, assistant professor of chemistry, who helped create M-Write. In a class of several hundred students where developing good writers isn't the main objective, however, that sort of arrangement is virtually never feasible, she said.

At this stage of development, the automated text-analysis tool only works with pre-programmed prompts and is not intended to replace instructor grading. Yet Anne R. Gere, the Gertrude Buck Collegiate Professor of Education and professor of English language and literature who serves as director of the writing center, acknowledged

that inserting the word "automated" into a conversation about writing instruction is controversial, and that there are "many, many conservative literary people who will indeed be appalled."

> "This is not a project about improving student writing per se. It's a project about helping students learn better, and writing is a very powerful form of student engagement and learning. We're trying to harness that power."

Gere, the incoming president of the Modern Language Association, compared automated text analysis to radioactivity -- large blasts of it can be fatal, but targeted doses can cure disease, she said.

"Perhaps because I'm a humanist, I always think technology needs to have a human element as well," Gere said. "This is the place where the humanities and sciences can come together to create better learning for students across the curriculum."

As covered by *EdSurge*, the automated text-analysis tool will be tested in a statistics course this fall. For three semesters, students in that class have responded to the same writing prompts, producing hundreds of essays on the same topics. The M-Write team has pored over those papers, identifying the features of papers that met the assignment criteria and those that missed the mark. The findings will be used to design an algorithm that makes the text-analysis tool look for those features.

In one of the prompts that will work with the automated text-analysis tool, students are asked to review an advertisement for a pizza company and write one for a rival business, using statistical evidence to build their case. To analyze the essays, the tool will look for specific words and topics, such as if students make an argument out of statistics showing that their business sells larger pies, Gere said.

The tool is not intended to automate grading decisions, however -- only the process of giving students feedback about their writing. The M-Write team plans to use ECoach, a support platform developed at the university, to send students personalized messages. For example, if the automated text-analysis tool determines (and writing fellows agree) that a group of students haven't grasped how to incorporate peer feedback into a revised paper, the system will send them pointers on how to do so.

"This is not a project about improving student writing per se," Gere said. "It's a project about helping students learn better, and writing is a very powerful form of student engagement and learning. We're trying to harness that power."

The tool is intended to give faculty members valuable feedback as well, Gere said. If the tool finds that many students struggle with an important course concept, faculty members would learn about it early in the semester and perhaps change an upcoming lecture to ensure the topic receives some extra attention.

"The way that we think about the automated text-analysis tool is that it's not from a standpoint of trying to score or grade the writing," Shultz said. "We really want to use the automated text-analysis tool in order to provide information to the faculty members to help them understand how students are learning." ■

https://www.insidehighered.com/news/2017/07/10/university-michigan-prepares-test-automated-text-analysis-tool

Large-Scale Assessment Without Standardized Tests

By Colleen Flaherty // February 23, 2017

First data, based on analysis of work at 92 colleges, finds much success in writing, some success in critical thinking and more limited success in quantitative skills.

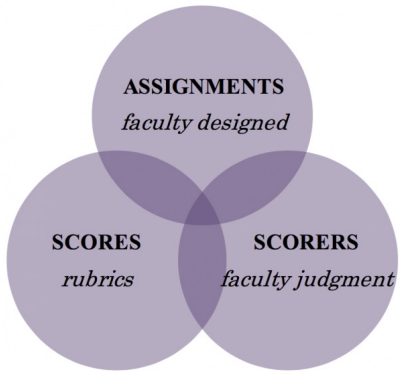
Meaningful assessment of student learning, beyond tests and grades, befuddles even seasoned educators. Are students really absorbing what they're being taught, and will they remember it later on? How can that be measured and compared nationally? Those questions, among others, drive the work of the Association of American Colleges and Universities, which today released a report on what it calls a "groundbreaking approach" to assessing student learning.

"This project represents the first attempt to develop a large-scale model for assessing student achievement across institutions that goes beyond testing," Lynn Pasquerella, president of AAC&U, said in a statement. She the called preliminary data on which the report is based "encouraging," and promising in terms of improving educational quality and equity.

The report, "On Solid Ground," includes results from the first two years of AAC&U's national Valid Assessment of Learning in Undergraduate Education (VALUE) initiative. It's something of a portrait of student performance in critical thinking, written communication and quantitative literacy. Educators and employers agree all are essential for student success in the workplace and in life, according to AAC&U.

Professors from 92 public and private associate and bachelor's degree-granting institutions across a range of competitiveness uploaded approximately 21,000 samples of student work to a web-based platform. Some 288 trained educators from across disciplines then scored the work on a scale of zero to four, using AAC&U's previously released VALUE rubrics in the key areas. About one-third of the samples were scored twice, to ensure consistency. (Sample rubric on next page.)

The VALUE approach tries to get at student learning in ways that standardized tests or other assessment practices don't by "embracing" complexity instead of trying to eliminate or rejecting it. So rather than something "divorced from the curriculum," the report says, student assessments included in the initiative were all designed by professors in an actual college course.



AAC&U's VALUE approach to student learning.

All work came from those students who had completed 75 percent of more of the required coursework for an associate or bachelor's degree. The students' samples were supposed to show some of their best, most motivated work, to see how much they'd learned thus far in their studies.

Lots of Critical Thinking, but Room for More

Key findings include that the strongest student performance was

CRITICAL THINKING VALUE RUBRIC

for more information, please contact value@aacu.org

Association of American Colleges and Universities

Definition

Critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone	Milestones		Benchmark
	4	3	2	1
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

in written communication. It's good news for the many institutions that have in recent decades focused on improving student writing. Yet the study also revealed that students still struggle to use evidence to support their written arguments. (See graph on next page.)

Regarding critical thinking, students tended to explain issues well and present related evidence. However, the study says, students have more trouble "drawing conclusions or placing the issue in a meaningful context (i.e., making sense out of or explaining the importance of the issue studied)." (See graph on next page.)

The curricular focus on developing critical thinking skills in students through their major programs, which faculty claim is a priority, according to the study, "is reflected in the higher levels of performance among students in upper division course work in the majors."

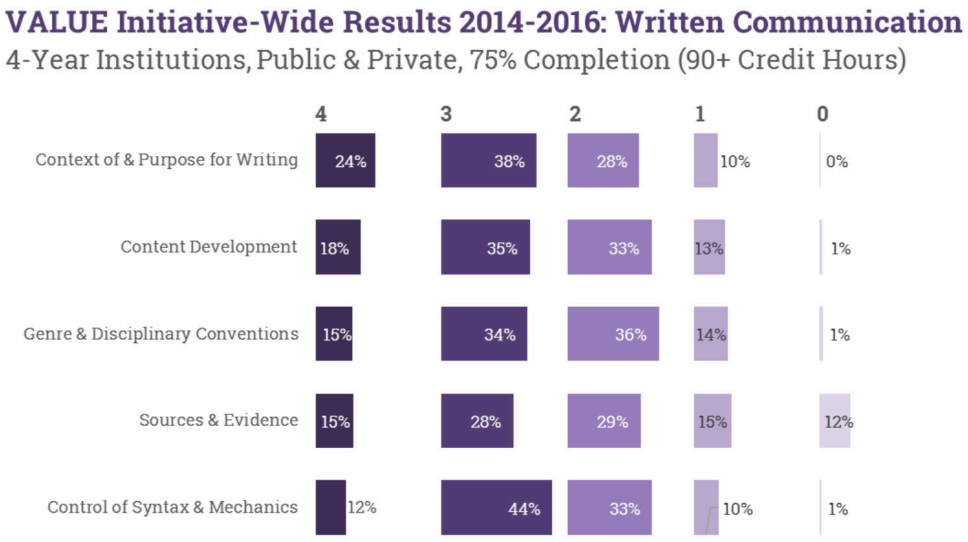
Students showed strength in calculating and interpreting data. Their quantitative skills were generally weaker, however, when it came to making assumptions and applying their knowledge.

Such results suggest that students are getting the mechanics of math and related skills, but not so much the "why," or when and where to use certain calculations, according to AAC&U. (See graph on next page.)

"In a world awash in data,VALUE generates evidence — evidence that points to what is working well and, critically, where there is room for improvement," AAC&U asserts. "It empowers faculty as both disciplinary and pedagogical experts, yet at the same time challenges faculty to interrogate their own teaching practices and assumptions about how their students in particular come to master important knowledge, skills, and abilities within the context of their classes. If faculty are truly the owners and arbiters of the curriculum at each institution, they — in partnership with their students — must also own the learning."

Achievement Levels

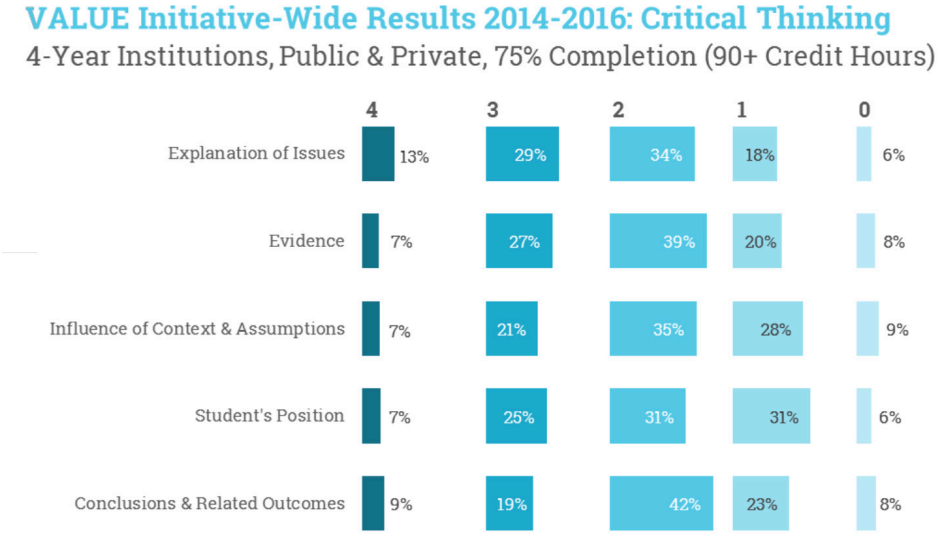
Students at four-year institutions who had completed 90 credit hours showed higher average achievement levels than students at two-year institutions who had complet-

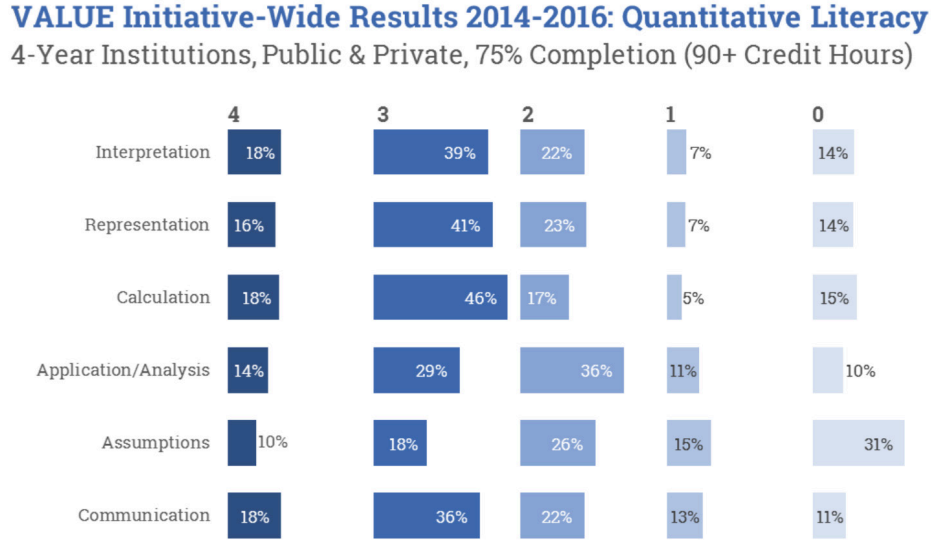


ed 45 credit hours, the report says, "suggesting that the continued focus on core essential learning outcomes (e.g., Writing Across the Curriculum, upper-division writing-intensive courses or upper-division courses that require thinking critically within the major) supports enhanced levels of higher-order achievement across the three learning outcomes."

Assignments themselves were important, too, as early results point "in several ways to the importance of the assignments in students' abilities to demonstrate higher, second-order quality work," reads the report. "What institutions ask their students to do makes a difference for the quality of the learning."

Scorers of student worked weighed in on the validity of the rubrics, and reported that they covered the "core dimensions of learning" in each of the learning outcomes. They also said the rubrics could be used for judging quality of learning in different courses in different fields by faculty from different departments — a testament to the transferability of the initiative to institutions beyond the pilot group.





Regarding reliability, there was generally agreement among raters on student scores. Weighted percent agreement ranged from 84 percent on some dimensions of quantitative literacy to 94 percent on some dimensions of written communication.

"A key feature of our assessment

strategy is the scoring of authentic student work using a common rubric, which the AAC&U VALUE rubrics provide," said David Switzer, faculty fellow for assessment and associate professor of economics at St. Cloud State University."Our participation in the [collaborative] has given us both the knowledge and the capacity to assess student work from all across the university, and shed light on how to assess student learning in co-curricular programs."

The report notes that policymakers want to know more about student learning, too. That's potentially concerning to professors who worry about assessment data being used to make decisions about funding or other matters that may not actually benefit the institution. Yet some professors involved in the study said it helped take some pressure off instructors.

"On our campus, in particular, we have used the VALUE rubrics as models to launch discussions as we ask faculty to work toward articulating a shared understanding of what it means to be teaching courses that fulfill our distribution requirements," Alexis D. Hart, associate professor of English and director of writing at Allegheny College, said in the report. "These discussions have really changed the tenor of assessment from one of policing faculty teaching practices to enriching conversations about teaching and learning and how assessment can inform those conversations."

Looking ahead, AAC&U is focused on disaggregating data based on student characteristics, such as whether they're from low-income families.

"The ongoing VALUE initiative puts learning outcomes quality and improvement in the hands of state and institutional leaders, faculty, and students — exactly where it needs to be if educators and policy makers are serious about preparing graduates for success beyond the first job and in their personal, civic and social lives, regardless of what type of institution they attend," the report says.

> "This project represents the first attempt to develop a large-scale model for assessing student achievement across institutions that goes beyond testing."

AAC&U worked together on the VALUE initiative with the State Higher Education Executive Officers, the Multi-State Collaborative to Advance Quality Student Learning, the Minnesota Collaborative and the Great Lakes Colleges Association Collaborative, along with participating institutions. Taskstream is the project's technical partner.

The Bill & Melinda Gates, Spencer, Sherman Fairchild, Lumina and State Farm Companies Foundations all funded the initiative, along with the Fund for the Improvement of Postsecondary Education and the U.S. Education Department.

'A Win for All Parties'

Carol Rutz, director of the College Writing Program at Carleton College, appreciates the complexities of assessing student learning, in part by having co-written the 2016 book, *Faculty Development and Student Learning: Assessing the Connections*. Carleton wasn't involved in the VALUE study, but Rutz was on the national team that developed the initial VALUE rubric for written communication.

She said she was initially "dubious" that AAC&U's rubrics were being tested as benchmarks, since she'd argued that local context matters "more than ratings derived from a national, generic instrument" — what many object to about standardized tests.

Now, though, Rutz said, "I can better appreciate what the study offers." She called the VALUE initiative's strength its design, in that rubrics were taught to faculty members from participating institutions, the material that was rated was coded and distributed among readers, and the ratings were analyzed

"with clear awareness of the limitations." AAC&U cautions, for example, that the preliminary data "are not generalizable beyond the three individual VALUE Collaboratives," and that extrapolating meaning and "making inferences about the quality of learning at the state or national level are entirely inappropriate at this time."

Professors "reading genuine student work shows that student products can be assessed outside of the classroom situation in a responsible way, thanks in large measure to qualified readers," Rutz added. Better yet, "the data point toward the necessity for considering the assignment as well as the student work itself."

Indeed, that's a point her recent book makes, and part of Carleton's portfolio assessment that has provided, in Rutz's words, successful, iterative faculty development on assignment design.

"If the planets had aligned favorably, I would have jumped at the chance to see how Carleton students' work stacks up. For now, I look forward to hearing more about the VALUE study, including faculty development implications."

Terrel Rhodes, vice president of quality, curriculum and assessment and executive director of VALUE at AAC&U, said grades were long thought to be good measures of learning, and they still are — except that they rely heavily on content mastery.ncreasingly, he said, accreditors, employers and others want to see that students have learned "transferable" skills, not just content.

"If we have seen anything in recent years [in] change and news, challenging issues increase in occurrence," Rhodes said. "We see how incredibly important it is for students to not only know things, but know what to do with what they know." They also need to know where to look when they don't know something, he added.

As for VALUE, he said, "AAC&U was in right place at right time, with a strong frame and tools that faculty and administrators and employers accepted."

Natasha Jankowski, director of the National Institute for Learning Outcomes Assessment and a research assistant professor of education policy, organization and leadership at the University of Illinois at Urbana-Champaign, called VALUE "a wonderful shift away from assessment as a compliance or reporting exercise to one that is embedded in the lived experiences of faculty."

By making clear connections to assignments in the classroom, she said, policy makers are able to get a "better picture of student learning, while faculty receive meaningful information that can be used to revise teaching and learning strategies in ways that benefit students.

"This is a win for all parties involved and one that positions policy makers to better communicate with institutions on measures of importance to both parties." ■

https://www.insidehighered.com/news/2017/02/23/aacu-releases-report-national-large-scale-look-student-learning

Loud and Clear

By Colleen Flaherty // March 7, 2017

Study details tool to help professors measure how much active learning is happening in their classrooms.

Want to be a more effective teacher? There's an app for that. Or, at least, there soon may be.

"Classroom Sound Can Be Used to Classify Teaching Practices in College Science Courses," published this week in Proceedings of the National Academy of Sciences, previews a new tool that measures the extent to which professors use active learning in their classrooms. Scholars involved in the study hope to make the tool into an iPhone application so others can work to increase their use of high-impact teaching practices. For now, it's available online, here.

"It's really hard to change if you don't measure what it is you're starting with," said the study's co-author, Kimberly Tanner, professor of biology education at San Francisco State University. "It's like trying to lose weight without a scale. To make changes you need some really quick feedback."

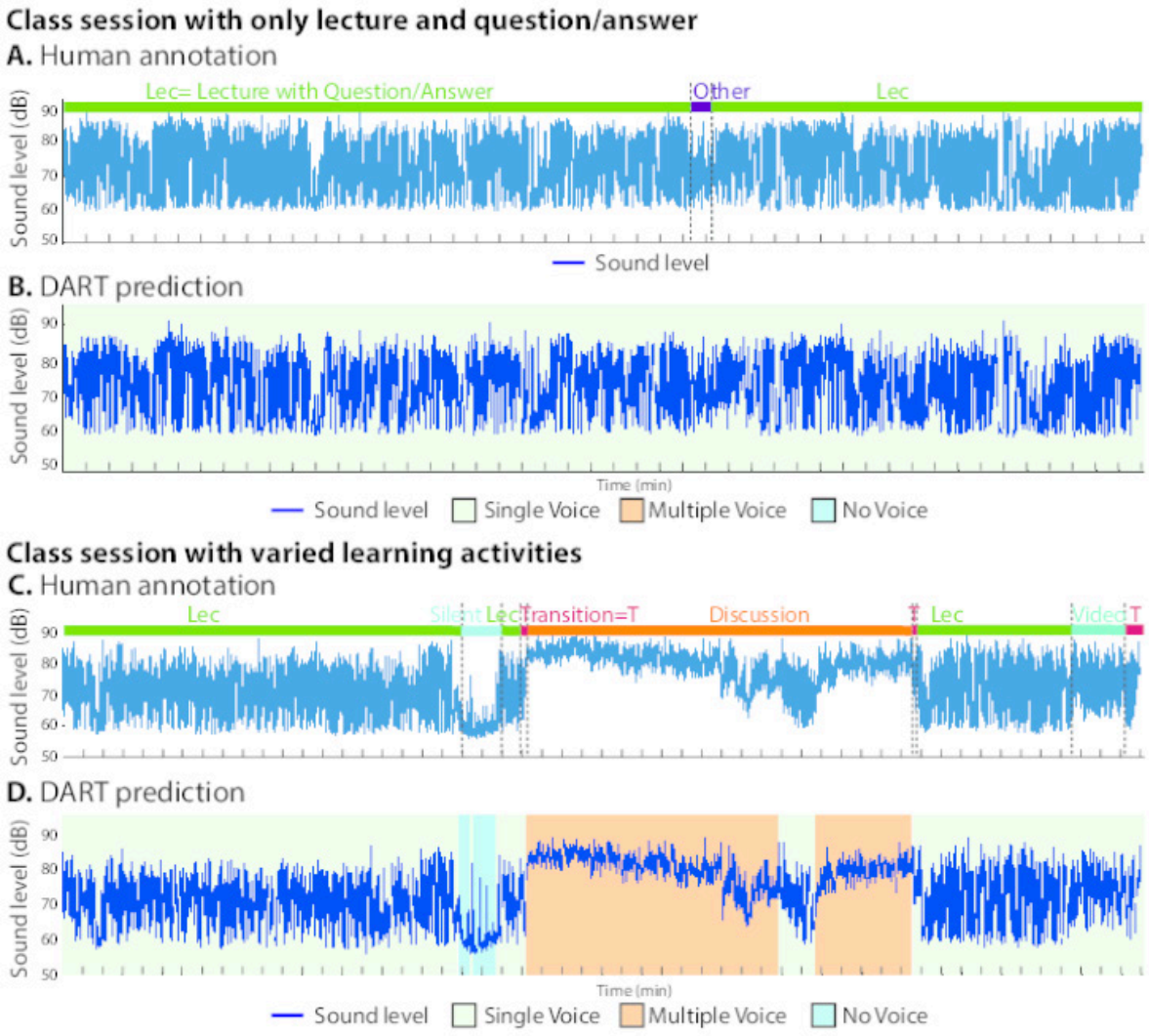
Active learning happens when students participate in classroom discussions and solve problems, rather than just listening passively. And previous studies suggest that active learning results in greater learning gains and student retention rates than lecture-only courses. So Tanner and dozens of other researchers across natural science, technology, math and engineering fields and institutions worked to create and test a machine-learning algorithm that uses sounds to identify teaching styles in college and university classrooms.

They argue that there's a particular need for their tool in the natural sciences, since hundreds of millions of dollars have gone toward improving STEM teaching nationally in hopes of keeping students -- especially underrepresented minorities and women -- in the so-called pipeline. And while all evidence suggests that significant learning gains can be made by many professors incorporating even a little active learning into their courses, the study says the "extent to which large numbers of faculty are changing their teaching methods to include active learning is unclear."

The new tool is called Decibel Analysis for Research in Teaching, or DART. It reports what types of activities are going on in a classroom based on sound waveforms, categorized as follows, down to half-second audio samples: single voice, multiple voice and no voice. Lectures and question-and-answer periods count as single voice and are indicative of a nonactive teaching style.

Multiple voice samples, including discussions and transitions, are considered active learning, as are no-voice samples, such as when the entire class is engaged in a silent writing activity.

Essentially, DART computes the volume and variance of sounds in a classroom. Average volume and high variance indicates one person speaking at a time, or lecturing or otherwise not engaging students



in active learning. High volume and low variance, observed in multiple-voice, pair discussions, for example, means active learning. Low volume and low variance also means active learning is happening, as all students are likely engaged in a task.

The idea behind DART is that professors don't have to guess how much active learning they're asking their students to do, but can actually measure it to a relatively precise degree. Based on an initial study of 1,486 class session recordings from 67 community college and four-year university STEM courses, DART is 90 percent accurate, in classroom settings both big and small. In other words, the algorithm was nearly as good at determining what kind of learning was happening as were human annotators in the large-scale study of 1,720 class hours involving 49 instructors.

Perhaps surprisingly, the amount of time spent on active learning was higher in courses for biology majors than non-biology majors. The authors take this finding as a proof that DART can be used to study teaching styles across more disciplines, institutions and course types going forward. All courses in the study were taught by professors who had completed STEM-teaching professional development.

Over all, the professors fared well in their pursuit of active learning. While single-voice instruction was observed in all courses a majority of the time, 88 percent of analyzed courses used active learning in at least half the class sessions. Female instructors were more likely to engage their students in active learning than were men.

Tanner said that professors some-

times don't mean to dominate class time with lectures, but passion for their subject matter can unwittingly lead them away from active learning. DART is a clear, objective measure of how often that's happening, she said.

The Association of American Colleges and Universities works to promote high-impact teaching practices, among other goals. Lynn Pasquerella, president, said via email that these practices should be "infused throughout a student's entire curriculum," and DART's value is that it offers a "point of information" for faculty members who are committed to engaged learning.

"If faculty tend to overestimate the amount of time their students are engaged in active learning processes, DART can provide data that will prompt the redesigning of assignments and foster enhanced student engagement," she said. "Learning outcomes can then be assessed comparing courses that rely most heavily on active learning with those that are dominated by lectures. We know that high impact practices have a disparately positive effect on students from underrepresented groups. As a result, there is significant potential for this tool to advance the equity imperative in STEM and beyond."

Again, the paper suggests that DART could aid "systematic analyses" of the use of active learning in classrooms, and says that its relative simplicity, affordability and ability to protect student and professor privacy (capturing sound types, not course content) make it ideal for such a pursuit. Tanner emphasized that it's a tool to improve one's teaching and learn more about the profession, and said it shouldn't be used by external parties for evaluation or punitive purposes.

"I think that DART will allow us to ask questions about how things are and aren't changing in higher ed," she added. ■

https://www.insidehighered.com/news/2017/03/07/study-details-tool-help-professors-measure-amount-active-learning-happening-their

Views

A selection of essays and op-eds

Flipped Online Course Improves Math Success

By Claire Stuve // August 9, 2017

Claire Stuve says research conducted by the University of Toledo shows that blended and adaptive learning lead to the most successful outcomes.

It's no secret that success rates in introductory math courses are low, which leads to decreased retention rates as students fail to graduate. Furthermore, when these introductory courses are online, students face an even steeper uphill battle.

After years of research, the Department of Mathematics and Statistics at the University of Toledo found a unique approach that led to improving student success in its online trigonometry course.

Online Blended Learning

Research has shown that blended learning is the most successful delivery method. Therefore, the department established a synchronous component in each of its online courses.

This means that students are required to meet in a live online classroom each week, essentially making this a blended online course but still completely online.

Moreover, this was a flipped blended online course. Students went through a module at their own pace before the synchronous session that week, starting with an introduction, a list of learning objectives, and then learning about each topic in the module by reading and watching videos.

Each module incorporated spaced practice, interleaving and retrieval practice. Then when students met for class, they worked in groups to solve everyday problems using the concepts they learned from the module.

Claire Stuve

Although students were aware of the weekly meeting time before

registering for the course, some of them could not meet during the specified time and were unable to attend a face-to-face section at another time.

Because the activities that were completed in the synchronous sessions were designed so that they could also be completed asynchronously on a discussion board, students who were unable to meet during the specified time were still able to practice applying what they learned with their peers and get instructor feedback.

Adaptive Learning

Students often come into a math course with varying levels of knowledge, yet courses are taught at one level and one pace. To overcome this obstacle, an adaptive learning system was incorporated into the course.

This system determined what students knew, what they didn't know yet and what topics they needed to spend more time studying. This allowed students to spend their time on concepts that were the most difficult for them instead of equal time on all topics.

Additionally, the system incorporated mastery learning, so students had to prove they understood a concept before moving to the next, a crucial component to a math course in which concepts build upon one another.

Results and Tips

Based on exam scores and course evaluations, students earned better grades and had higher satisfaction than previous semesters. Not only did student success increase, but so did their affinity for mathematics, and all it took were a few changes to the course design.

To incorporate these aspects into any online course, the following tips are helpful.

1. Use a flipped model.

Introductory math courses are often populated with students who have not been successful in math and struggle with the subject. With a flipped model, these students can work through the content in a learning management system at their own pace. Students can spend as much time as needed with the material to gain a full grasp on what they are learning.

Then when students meet for class, the instructor can spend the time applying the basics that students learned on their own in a way that will allow for deeper learning and an increase in students' self-efficacy in mathematics.

2. Spaced practice, interleaving and retrieval.

When students are allowed to go through material on their own time, they can spread out their learning over the course of a week instead of cramming it into one face-to-face lecture.

Content in a learning management system can also be designed so that topics are interleaved with one another, which research has shown to strengthen memory.

Likewise, when students constantly practice retrieval, through topics reappearing in each module after they are introduced, their understanding and memory of concepts last far beyond the semester.

3. Incorporate adaptive learning.

Adaptive learning provides the best learning experience for each student based on that student's individual needs. It allows students to spend the majority of their time on the topics that are the most difficult for them, and it requires students to master each topic before moving to the next. Therefore, students do not lack prerequisite knowledge when learning a new concept.

4. Set up synchronous sessions.

Before the semester starts, choose a day and time each week to meet synchronously using web-conferencing software. Students can connect from anywhere in the world, as long as they have a reliable, high-speed internet connection. This allows students the flexibility of taking an online course, yet they still have an opportunity to work with their peers and instructor in real time.

Do not use the sessions to lecture or introduce students to concepts. Rather, use this time to guide student practice and apply mathematical concepts to real-life scenarios.

5. Keep students engaged.

The majority of students in this course said their favorite part of the modules was the videos. They were able to play the videos at variable speeds, pause, rewind and watch again.

Be sure that every concept is ex-

plained in the module in words and also with a video, including several examples for students to see.

Students reported that they were more engaged when watching several short videos compared to fewer long videos. Make content relevant to the real world, and students will be more likely to want to learn.

Also, don't be afraid to be funny! Include memes and jokes and let your students know at the beginning of every module that that module is your favorite.

Humor and instructor excitement about the subject go a long way in keeping students interested in the material.

> "Introductory math courses are often populated with students who have not been successful in math and struggle with the subject. With a flipped model, these students can work through the content in a learning management system at their own pace."

6. Make content accessible.

It is essential to be fully inclusive and supportive of all learners, not just those in your course with documented disabilities.

To help students succeed, be sure that all videos are captioned, content is keyboard accessible, documents are compatible with screen readers and there are limited colors and easy-to-read font types. ■

Bio:
Claire Stuve is assistant director of educational technology and research supervisor at the University of Toledo.

https://www.insidehighered.com/digital-learning/views/2017/08/09/flipped-online-course-improves-success-math

Measuring Learning Outcomes From Military Service

By Steven Delvaux // /June 16, 2017

Colleges educating nontraditional learners would do well to study the Army's competency-based approach, writes Steven Delvaux.

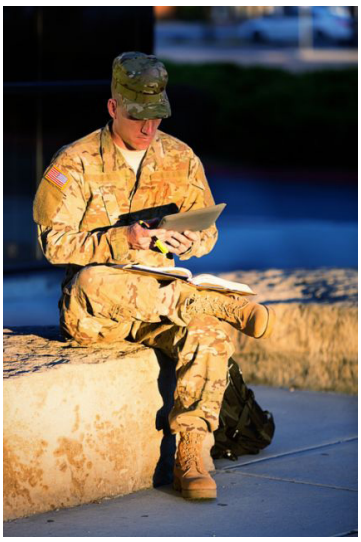
In a word-association game on "education," "the United States Army" would probably not be the first response given. But for those who work closely with the Army and understand the depth of the Army's interest, involvement and expertise in educating Americans, the Army's lack of recognition in the education field is puzzling.

It is hard to imagine any other institution that invests more time and resources to ensure its personnel are learning -- or one that has more at stake in the outcome of its educational efforts -- than the U.S. Army. American soldiers are serving and representing our nation in more than 130 countries, many in the crucible of ground combat or engaged in other high-risk activities. As both the producer and employer of those it educates, the Army is dependent on the graduates of its many schools and training courses to overcome the multitude of challenges it routinely faces in those countries. The Army has a vested interest in the learning outcomes achieved by its students and, as a result, works extremely hard to optimize those outcomes.

Indeed, the long and distinguished track record of the graduates of the Army's training and education system stands as proof of the Army's success in accomplishing its educational goals. In the 241 years of its existence, the Army has produced highly adaptive, agile and innovative soldiers and leaders who have been able to apply critical and creative thinking skills to conquer the myriad challenges thrown their way -- and under some of the most extreme conditions imaginable.

Undervalued Learning Outcomes

That the Army is not widely recognized for its expertise in education is no doubt largely because education is not its core mission -- it exists to fight and win the nation's wars. To do that, however, the Army requires



educated soldiers. Training, educating and developing soldiers is, thus, an integral means of achieving its ultimate end.

Many people also hold the view that the Army's training and education system is primarily just vocational, skills-based training that doesn't require the type of cognitive engagement that America's colleges and universities purport to develop within their graduates. But producing technicians is only part

of the Army's training and education mission requirement. The larger, and by far the most important, part is its obligation to develop young men and women who can solve what are frequently complex problems while simultaneously completing highly technical tasks.

Thus, as much as any academic institutions (and arguably more so), the Army is in search of the holy grail of education: developing learners who can transfer and apply their learning in different environments to achieve optimal results no matter what the conditions.

Perhaps the largest reason for the failure of many to recognize the Army as a premier learning organization, however, is that the Army doesn't record its learning outcomes in the ubiquitous Carnegie unit (credit hour) format. In fact, the absence of a registrar-validated transcript with learning recorded in credit hours is possibly the single biggest reason for soldiers receiving inadequate credit for the learning that occurs during their Army training, education and experiences.

Without that acceptably certified record of learning, soldiers leave the Army with a vast amount of assessed and validated knowledge, skills, attributes and competencies for which they more often than not receive little credit. Their educational outcomes are imperfectly communicated and poorly understood by employers and educators alike. And while many higher education institutions and businesses would surely like to give soldiers the benefit of the doubt and award them credit for their Army learning outcomes, they face risks from their own accrediting and licensing bodies and are limited in their ability to do so. The end result is that soldiers are often left with little to show for their extensive, taxpayer-funded training and education.

Assessing the Problem

For the Army, the issue is not as much a matter of receiving recognition for its educational outcomes as it is an issue of readiness. Critical readiness funds are being diverted from operations to pay for unemployment compensation for soldiers who aren't being hired, in part because of their lack of certified trade credentials. Meanwhile other funds are siphoned off for educational benefits to pay for learning that soldiers already received in the Army but are forced to repeat because it wasn't recorded in a manner acceptable to colleges and accrediting and licensing bodies.

Thus, garnering publicly recognized academic credit for the Army and its soldiers was one of the first tasks leaders took on upon the establishment of Army University in August 2015. After reviewing the problem, Army University leaders concluded that devising a means of recording Army learning in terms of credit hours, seeking academic accreditation for its numerous schools and granting soldiers academic degrees was fraught with numerous drawbacks -- and ultimately provided only a partial solution to the problem.

Expenses involved in paying for accreditation, hiring degreed or credentialed faculty, establishing a registrar and hiring additional personnel to perform the many other tasks required by accrediting bodies would rapidly mount and eventually become prohibitive.

Meanwhile, the vast majority of learning in the Army is difficult to measure in credit hours. Instead, it must be measured by a soldier's demonstrated ability to apply the knowledge, skills and attributes learned in a classroom or training area, or as a result of one's experiences, to accomplish a task. In short, the Army primarily uses competency-based education and experiential learning methods to achieve its developmental goals.

Effectively Measuring Learning Outcomes

Army University leaders came to recognize that what was needed to solve this problem was an acceptable method of capturing and recording the learning outcomes of its predominantly competency-based training and education system. They also soon realized that they were not alone in their search and unintentionally found themselves immersed in the contentious American education debate over measuring student outcomes.

The Army was, in essence, struggling with the same challenge that plagues many American colleges and industry today -- its learning outcomes are not being recorded in a way that is truly meaningful for employers or educators in pro-

viding them adequate information on students' or employees' distinct knowledge, skills and attributes. The resulting inability of employers to understand a potential employee's competencies leads to wasteful redundancies and inefficiencies as time and resources are spent re-educating and retraining students and employees to develop abilities they may already possess.

Army University leaders quickly came to understand that several organizations had already done much work to try to measure and improve student outcomes, such as the U.S. Department of Education in its Experimental Sites Initiative. Among ex-sites many experiments that are of immediate interest to the Army are those dealing with CBE, prior learning assessments and direct assessments -- all of which offer the possibility of developing an acceptable method of measuring and recording the learning outcomes of nontraditional education practices like those used by the Army. The Educational Quality Through Innovative Partnerships, or EQUIP, program further enhances the prospect of developing a solution to this problem.

Equally encouraging to Army University leaders were the efforts of the many academic institutions and educational foundations that are also seeking solutions to this problem, such as programs funded and supported by the Lumina Foundation, like the Competency-Based Education Network and Degree Qualifications Profile/Tuning program.

Even more specific to the Army's purposes is the Lumina-funded Multi-State Collaborative on Military Credit initiative. That program's stated goal of advancing "best practices designed to ease the transition of veterans and their families from military life to college campuses, with special reference to translating competencies acquired through military training and experiences into milestones toward completing a college degree or earning a certificate or license," is perfectly aligned with Army University's efforts to increase the recognition soldiers receive for their Army training and education.

> "In an era of limited resources, we will increasingly have no other option but to become more efficient in how we achieve our nation's desired learning outcomes."

Informed by these and the many other similar ongoing efforts in academe, Army University is establishing partnerships with such groups and working on its own tailored solutions. In 2017, the Army began prototype testing of MIL-CRED (Military Credentials), a microcredentialing ecosystem that offers the capability of capturing soldiers' learning outcomes at the granular level in a way that is meaningful to Army leaders, talent managers and soldiers themselves -- both while they serve and as they transition out of the Army.

The system records soldiers' learning outcomes as microcredentials (badges, credentials and certificates that contain the specific learning outcomes of a training event, school course or experience) and populates them onto a soldier's learner profile, or portfolio. That profile can then serve as a comprehensive digital résumé of the soldier's assessed and validated knowledge, skills, abilities, competencies and other learning outcomes, which colleges and universities could then use to award soldiers credit and properly place them in their academic programs.

Unlike academic transcripts, which have limited value outside of academe, the learner profile has the added benefit of being able to serve as a living document to which academic, military and industry learning achievements from training, education and experience alike can be added continuously throughout the learner's lifetime. In this, it is similar to the work being done by the University of Texas System's Institute for Transformational Learning, which, in conjunction with Salesforce, is working to establish a record of a "learner's academic and professional accomplishments

across multiple institutions and experiences, building a portfolio that includes credits, competencies, microcertificates, degrees and other records of achievement."

In an era of limited resources, we will increasingly have no other option but to become more efficient in how we achieve our nation's desired learning outcomes. While somewhat late to this problem, the Army's demonstrated success in tackling big challenges and educating adults offers the potential for it to be a leading partner with academic, government and industry leaders when it comes to student outcomes. The fairly recent establishment of Army University has already led to the development of several meaningful relationships and collaborative efforts that have greatly aided the Army's efforts in this area.

For its part, the Army is able to bring value to these partnerships by sharing with its partners the Army's vast experience and proven success in educating nontraditional learners. Recent shifts in college student demographics -- away from the traditional recent high school graduates and toward diverse and nontraditional adult learners -- mirrors what has long been the bulk of the Army's own demographic. Colleges and universities without much experience dealing with the distinct needs and qualities of these learners would do well to study the Army's approach to training and education that has led to so many successful results with them.

Although it is rarely recognized for its role as an educational organization, the Army has a long and distinguished track record in training and educating adults who have proven their ability to fight and think their way through all types of challenges. As such, the Army, along with academe and industry, has the undeniable ability to play a major contributing role in developing a method of measuring -- and, most important, improving -- learning outcomes that could prove to be of great value to our nation. ■

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https://www.insidehighered.com/views/2017/06/16/what-colleges-can-learn-military-about-competency-based-learning-outcomes-essay

Challenging Superficial Solutions

By Dror Ben-Naim // April 10, 2017

The current obsession with predictive analytics avoids tough conversations about poor instruction and outdated pedagogy, writes Dror Ben-Naim.

Not long ago, the San Francisco investor and entrepreneur John Greathouse penned an op-ed in The Wall Street Journal claiming he had found a solution to the tech industry's diversity problem. Because of rampant bias in the tech industry, Greathouse suggested female job candidates should "create an online presence that obscures their gender" in order to improve their employment prospects.

The response was swift and vicious. Concealing one's gender in response to bias addresses the symptom rather than the disease (biased hiring managers/employers and biased hiring practices). Greathouse, critics contend, offered a "Band-aid": a superficial and ephemeral solution that avoids dealing with a deep-seated systemic challenge.

The temptation to optimize the path that people take through dysfunctional systems isn't, of course, limited to hiring practices. It is a familiar pattern in a higher education discourse obsessed with predictive analytics -- one that all too often avoids tough conversations about poor instruction and outdated pedagogy.

This temptation to fix people rather than dysfunctional systems reminded me of current conversations in education technology around how new technologies can improve student success. Specifically, the interplay between two powerful new approaches: predictive analytics and adaptive learning technologies.

Using predictive analytics as an early warning system to predict which student is likely to fail is becoming commonplace. The goal is as clear as it is noble: reduce the number of college dropouts by intervening early.

The New America Foundation recently published "The Promise and Peril of Predictive Analytics in High-

er Education," a report detailing ethical concerns involved in using data to make predictions and its impact on underrepresented students. (I served on the advisory board for the project.) Yet the report overlooks the fact that, despite well-intentioned efforts, early warning systems put the responsibility to change on the student when what those of us whose job is to improve student success -- educators, administrators and policy makers -- really must do is change the system.

To illustrate, consider this example: in 2007, my colleague Ganga Prusty, a professor at the University of New South Wales, Australia, inherited a course in first-year engineering mechanics that had a 31 percent failure rate. The high-enrollment, introductory-level course teaches students concepts and techniques to solve real-world engineering problems. Success in engineering mechanics is a prerequisite for most engineering-related majors. The high failure rate meant that nearly a third of students couldn't live up to their dreams of becoming engineers. And this, mind you, in an economy that's starved for STEM graduates!

At the time, I was doing my Ph.D. building something I called the adaptive e-learning platform -- years later it would become the technology behind Smart Sparrow, the company I founded -- trying to find ways to create digital learning experiences that are more than PDFs and PowerPoints. I was introduced to Prusty because our dean thought it would be useful to try to apply this new technology to real-world problems. I found myself for the first time trying to find new solutions for what is essentially a very old problem: student success.

Yes, Prusty could have intervened with at-risk students and advised them to consider another major, but is that what he should have done? Should he not instead have discovered why the course was failing one in three students, and tried to fix it?

Prusty and his team did the latter and started by identifying "threshold concepts," a term Jan H. F. Meyer and Ray Land introduced in 2003 that refers to core concepts that, once understood, transform perception of a given subject. After identifying the course's threshold concepts, Prusty and his team designed adaptive tutorials to teach engineering students what they needed to know.

Prusty's adaptive tutorials are a form of smart digital homework. They take students about an hour or two to complete as they work on solving problems with interactive simulations and receive feedback that is based on what they do.

For example, students learn how to analyze the mechanical forces that act on beams of a bridge by designing a bridge and driving simulated cars on it, measuring in the environment whether the forces they calculated were accurate. The system is "intelligent" because it can provide feedback based on the specific mistakes the student makes (called "adaptive feedback"). If the tutorial detects that a student would benefit from more examples or content, it dynamically changes the activity to show that content (called "adaptive pathways").

Prusty and his team designed four adaptive tutorials in all, delivered weekly to students and targeting the threshold concepts and common misconceptions students had.

It worked. Not only did students begin to enjoy doing homework -- an achievement in its own right -- but they also performed better in the course's assessments. Prusty's team did not stop there, however. They analyzed the way students learned using these adaptive tutorials, noticing what worked and what didn't, and then improved the tutorials. Over time, Prusty's team built and introduced eight more adaptive tutorials.

The result? After a few years, the failure rate dropped to 5 percent. That happened while using the same course, syllabus and final exam, and while growing the number of students by 70 percent. The only difference was the number and the quality of adaptive tutorials used.

Prusty replicated the process in another course (a more advanced course in mechanics of solids), and the failure rate dropped from 25 percent to 5 percent.

Now let's imagine that instead, we could have used predictive analytics to identify failing students. What would we have done? We probably would have found a clever way to identify students likely to fail the course and gently suggested alter-

native degree programs. But would that have been the ethical thing to do?

Put another way, if you have a course with a high failure rate, should you use technology to predict who's going to fail and alert them? Or should you fix the course? The former will improve your institution's graduation rates, and the latter will have you try to convince your faculty to address the issue.

Which one is easier? Which one is more ethical? What happens when student success and institutional outcomes conflict?

It is all too easy to design Band-aid solutions to higher education's completion crisis while ignoring more complex problems -- such as courses that are simply not good enough when we have an opportunity to redesign them entirely. Predictive analytics and adaptive learning are two sides of the same coin. But we will fall short at true improvement if we stop at analytics. ■

Bio:
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https://www.insidehighered.com/views/2017/04/10/essay-improving-student-success-may-mean-fixing-subpar-courses

Design Learning Outcomes to Change the World

By Cathy N. Davidson // August 28, 2017

We in higher education do a poor job helping students translate the specific content or knowledge gained in our classrooms into a tool that will help them thrive in life, writes Cathy N. Davidson.

Just the other day, a friend of mine, a superb cultural anthropology professor, was railing against her university's imposition of a requirement that every faculty member provide "learning outcomes" for their courses. It was the end of the semester, and she'd worked hard to provide a meaningful class for her students, and it felt cynical to then tack on a bunch of meaningless outcomes. Who hasn't felt anger at this increasingly frequent, seemingly cynical tendency of institutions to reduce the complexity of learning to a metric, productivity and outcomes?

That was certainly my response when, some years ago now, my own institution debated requiring faculty members to include such outcomes on their syllabus. I protested. Then I happened to be keynoting a conference that included a workshop for beginning faculty members, intended to help them design a syllabus, including identifying meaningful learning outcomes. I asked if I, a senior faculty member, could attend.

One of the young professors leading the workshop read out loud from a student course evaluation where the student noted that, until her professor had included learning outcomes on a syllabus, she had no idea why she was taking a given class or why her university thought this course (but not some other) should be required for general education distribution or for a major. She compared college to a child asking "Why?" and the parent responding, "Because I told you so."

You don't need to go very deep in the pedagogical research to know that the key to successful learning is for the learner to be aware of what the given knowledge will add to their goals and their life. As professors, departments and institutions, we tend to do a poor job connecting the lofty language of our "mission statements" to our actual practices: what we require, how we organize knowledge, how we facilitate learning and what we hope our students will gain from what they learn-- not just as job preparation (a shortsighted goal in a changing world) but also as preparation for a complex world where nothing is stable.

We do a poor job helping students translate the specific content or knowledge gained in our classrooms into a tool (informational, conceptual, methodological, epistemological or affective) that will help

them thrive in life. If higher education doesn't do that -- if it isn't geared to helping students succeed beyond the final exam and after graduation -- then why bother?

That workshop for beginning instructors helped me understand how I could turn learning outcomes from a cynical exercise into a key component of institutional change, starting in the realm over which I and other faculty members have control: how we run our classroom. Borrowing from the long tradition of progressive education that extends from John Dewey and Paulo Freire to bell hooks and Carol Dweck, I challenge my students to take the lead in their learning. In the case of learning outcomes, I now often leave that section blank on the syllabus and use part of the first or second class meeting to have students challenge themselves, thinking up the most aspirational, world-changing outcomes they can imagine.

I do this with a simple, traditional think-pair-share exercise. First, I ask students to take 90 seconds to jot out responses to an open-ended question: "What are the three most important things you hope to take away from this class and into the rest of your life?

That's the "think" part of the exercise. I then give them another 90 seconds to turn to "pair" with the student nearest them, introduce themselves, and take turns, with one person reading her three things and the other listening. This allows everyone a chance to express an original opinion without interruption or critique.

Once they have heard one another, I ask them to then work together to choose or craft one item that they will "share" with the class. In a small group, I have them read those out loud. In a large one, they might add them to a Google Doc. I once did a Think-Pair-Share with 6,000 international teachers in the Philadelphia '76ers arena. I try to do one TPS (as it's known in the pedagogy business) every class period in every class.

> "We do a poor job helping students translate the specific content or knowledge gained in our classrooms into a tool (informational, conceptual, methodological, epistemological or affective) that will help them thrive in life."

It is my conviction that we need thoughtful, active collective engagement and participation -- by both students and faculty members -- to transform not just our classrooms but all of higher education. We don't need more edicts from on high or technocratic solutions, but we desperately need engaged, participatory rethinking about what we really want for and from our students -- and for and from ourselves and our institutions.

Aspirational Learning Outcomes

Here are 10 of my favorite learning outcomes, including some used by various other students and colleagues over the last several years.

"In this course I hope that we will . . . "

1. Learn to respect intellectual life and education as a precious gift that no one can steal from us.

2. Be challenged by a scholar who maintains the highest standards of her profession to succeed educationally to our own highest standards in college and beyond.

3. Learn to absorb and transfer knowledge and wisdom from lectures, readings and class discussion into own cogent thinking and writing.

4. Form an appreciation of the importance of critical and creative thinking and problem-solving and use these to guide my future life and work.

5. Gain the highest respect for intellectual rigor, including self-respect.

6. Fight for the dignity and justice of all peoples, regardless of race, religion, national background, gender, ability or sexuality. We're all learning together.

7. Come to understand how every-

day incidents -- the small victories as well as the constant abrasions of life and politics -- are grounded in histories and cultural practices, including those of racism or other inherited and structural forms of discrimination that are sometimes invisible to those who perpetuate them.

8. Become a lifelong advocate for public higher education that can change lives and improve society.

9. Learn to masterfully control chaos whenever we are faced with a complex web of ideas and results.

10. Stay alert to surprise. Many times -- in class and out -- the best learning outcomes are the ones we never expected.

What are your aspirations for learning, in the classroom and out? What's missing here?

If you are inclined, I hope you will use the "Comments" section below to add your own aspirations for learning. Everybody learns when everybody is learning. ■

Bio:

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https://www.insidehighered.com/views/2017/08/28/learning-outcomes-help-students-translate-classroom-learning-life-tools-essay

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