



# Recommended Readings and Resources on Digital Pedagogy and Student Success

## The ACAIO Digital Fellows Program





# RECOMMENDED READINGS AND RESOURCES ON DIGITAL PEDAGOGY AND STUDENT SUCCESS

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### *About the ACAO Digital Fellows Program*

Launched in January 2017 with support from the Bill & Melinda Gates Foundation, the [ACAO Digital Fellows Program](#) is designed to provide senior campus leaders (i.e., Chief Academic Officers or CAOs) the critical information, resources, and support they require to help their faculty understand and adopt high quality digital courseware that personalizes learning and leads to significant gains in undergraduate engagement, retention, and graduation.



The ACAO Digital Fellows Program is supported by a generous grant from the Bill & Melinda Gates Foundation.



# Digital Pedagogy and Learning

Digital pedagogy and learning refer to any type of teaching/learning facilitated by technology. Simple applications of technology include accessing digital content and grading online, while more complex applications include use of digital tools to collaborate, apply, model, curate, and/or create and also the use of adaptive learning technologies.

Digital courseware is a solution with the potential to support student-centered learning at scale in post-secondary education. While millions of students use digital courseware today in their college courses, significant opportunity remains for effective digital courseware use to support new teaching and learning strategies, improve course accessibility, and drive improvements in learning outcomes for postsecondary students. (*source: [Courseware in Context](#)*)

## HIGHER EDUCATION IN THE DIGITAL AGE

Technology and digital tools are ubiquitous in the lives of students and faculty. Yet these resources are still not utilized to their full potential in promoting meaningful learning, facilitating retention and degree completion, and enhancing student outcomes.

- Students and faculty routinely communicate using e-mail.
- Students and faculty regularly use mobile devices, but infrequently use them as teaching and learning tools.
- Learning managements systems (LMS) are now ubiquitous, but institutions and faculty typically continue to use the LMS in ways that mimic a traditional classroom setting. As with other technology applications, much of the actual LMS activity is often in just 20-25 percent of the application's features and functions.
- Colleges and universities across all sectors now offer more online courses, but many continue to design online courses in ways that mimic traditional brick and mortar classes.
- Campuses have more technology available, but students and faculty are often unaware of it, are or unsure how to use/access it, or feel that it is not effectively supported by their department or institution.
- Despite the continuing campus and public conversations about the important role of information technology in instruction, comparatively few campuses have adapted an expanded notion of scholarship that acknowledges faculty instructional innovation in the review and promotion process.

## OPPORTUNITIES FOR USING DIGITAL PEDAGOGY

*(Adapted from: [odl.mit.edu](#))*

### Digital tools help...

- **Instructors improve instructional techniques** through evidence-based research and hybrid learning models that enable instructors to measure how students learn most effectively.
  - Can draw from the best content previously developed by other instructors and colleagues, from within the same or from other institutions.
- **Students learn more fully** through dynamic opportunities for discussion, debate, collaboration, application, conjecture, and edification.
  - Tools for learning include: rapid assessment, games, annotation technology, videos with multiple instructors, discussion boards, and online support.
  - Tools for application include: flipped classrooms, simulations, visualizations, modules, and digital labs.

- **Universities collect more accurate data about students' progress and abilities.**
  - Better data and analytic tools identify opportunities to *do better* to enhance student learning, retention, and outcomes.
  - Changing the campus culture to use data as a resource, not a weapon.
- **Instructors leverage time better** by providing them with quick feedback regarding where students are struggling and thriving.
  - Facilitates targeted instruction based on students' real time needs
  - Eases or eliminates routine grading
- **Students learn more efficiently** with the aid of digital assessments that give them rapid feedback on their understanding.
  - Within digital assessments, students also benefit from adaptive hinting, which provides guidance to incorrect responses, corrects misperceptions immediately, and helps students to figure out problems in real-time.
- **Universities intervene more quickly and effectively with students who are struggling.**
- **Instructors differentiate for students' diverse needs** by recommending or providing students with personalized and existing digital tools and resources.
- **Students learn with mastery** by pacing their own learning, reviewing material as needed, and assessing their understanding before moving on to a new concept/skill.
- **Universities ensure more students persist** by developing customizable pathways to degrees.
- **Instructors spread knowledge widely** through digital platforms that can reach more students.
- **Students learn anytime, anywhere** through affordable and accessible asynchronous classrooms.

#### **Additional Opportunities**

- Cost savings through open resources and textbooks
- Adaptive technology that anticipates and responds to learners' skill levels and needs
- Learning spaces that facilitate more productive use of digital and technology tools and resources
- Learning analytics and data that grow increasingly nuanced
- Integrated planning and advising
- Embedded peer interactions and connectedness
- Group messaging

### **IMPLEMENTATION CHALLENGES**

- Students experience disparities in access to technology platforms, high-speed broadband connectivity, and engagement.
- Faculty resist adoption due to general resistance to change compounded by technology and digital anxiety. Many also often believe that online and digital tools are inferior and/or cumbersome.
- Too absence of clear and compelling evidence about the impact and benefits of information technology and digital learning resources on student learning and outcomes. Too much of the discussion remains driven by opinion and epiphany rather than evidence of impact.
- Faculty feel overwhelmed by selecting and implementing the right tool for any particular learning objective.
- Faculty feel ill-prepared or supported to adopt digital tools.

- Fragmented implementation, as individual academic units go their own way with leveraging digital resources for teaching, learning, and instruction.
- Absence of a clear and compelling institution plan for leveraging digital resources to improve student learning, enhance institutional outcomes, and improve retention and graduation rates.

## ONLINE RESOURCES AND REFERENCES

<a href="#">Cal Recommended Sources on Digital Reading</a>	Annotated bibliography of articles and studies regarding digital reading
<a href="#">Teaching in a Digital Age</a>	Open access textbook
<a href="#">Digital Tools for the Classroom</a>	List of digital tools generated by MIT's Office of Digital Learning
<a href="#">Strive for College/I'm First</a>	Tools, mentorships, and support for first gen college students
<a href="#">CUNY Innovation Survey</a>	Disruptive and innovative projects and assignments
<a href="#">EdSurge Digital Learning Network</a>	Digital tools and examples
<a href="#">UNC reviewed EdTech/Apps</a>	Reviewed apps and digital tools
<a href="#">The Pedagogy Project</a>	Examples of how to incorporate digital tools
<a href="#">EdSurge Newsletter</a>	Newsletter regarding education technology
<a href="#">EDUCAUSE Constituent &amp; Discussion Groups</a>	Various Listservs about IT issues in higher education
<a href="#">The Merlot Project</a>	Offers a curated collection of free and open online teaching, learning, and faculty development services.
<a href="#">Courseware in Context</a>	Provides an inventory and assessment of digital learning resources.



# The ACAO Digital Fellows Project

## PROVOSTS AND DIGITAL LEARNING: An Interim Report from the ACAO Digital Fellows Project

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ACA0 Digital Fellows Project  
January 2019

Who has led the campus efforts to advance and support technology-enhanced pedagogy and instructional innovation at most colleges and universities: the provost/chief academic officer (CAO) or the chief information officer (CIO)?

Beginning with the arrival of personal computers in the early/mid-1980s, much (perhaps most) of the campus discussion about institutional leadership on technology and digital pedagogy has focused on (or involved) CIOs. The integration of IT into the curricular experience of undergraduates has often been viewed primarily as a technology challenge rather than pedagogical issue. And as a technology issue, the (perceived) pressing challenges were often about hardware, software, technical support services for students and faculty, an expanding (and increasingly expensive) institutional technology infrastructure, and the evolving campus technology strategy. Moreover, CIOs often lead because many CAOs (like many professors) deferred to technical experience and expertise of their CIOs and tech-savvy faculty colleagues. Too, save for the small number of institutions that launched student notebook initiatives, the pedagogical issues were more often about departmental preferences and strategies rather than institutional priorities.

Moreover, the actual (or inferred) leadership role of CIOs for various “technology-touched” instructional initiatives often extended into online education at many institutions. For example, data from the [2016 Campus Computing Survey](#) reveal that online/distance education programs reported to CIOs at a fifth (19 percent) of the institutions participating in the annual survey. The fall 2016 survey numbers ranged from a high of 28.1 percent in private universities to a low of 11.1 percent in private, non-profit BA/MA institutions.

Yet in most academic enterprises, CIO responsibilities are operational, not academic and not programmatic. In other words CIOs typically *are not* responsible for academic programs and related academic initiatives. Nonetheless, even as CIOs typically report to either CAOs or presidents, IT officers often emerged as the presumed institutional leaders (or catalysts or sponsors) of technology-driven instructional innovation at many institutions.

Yet academic programs and related operations – teaching, learning and scholarship – are traditionally the domain of provosts/CAOs. Indeed, scholars of higher education and campus culture view CAO engagement and leadership as essential for any major changes in academic strategy, institutional mission, or other related major initiatives. As noted in a 2015 *Chronicle of Higher Education* article titled [The Path Change Runs Through the Provost’s Office](#), “if a campus is going to pursue new priorities, fix systemic problems, or adopt innovation on a broad scale, a provost will most likely be directing the charge. To do that, the provost has to listen, inform, discuss, and persuade, engaging people from all corners of campus.”



Support for the leadership, operational, and strategic role of the provost/CAO in campus efforts to leverage and expand the use of digital pedagogy was the catalyst for the [Digital Fellows Project](#), hosted by the Association of Chief Academic Officers (ACAO). Launched in 2017 with support from the Bill & Melinda Gates Foundation, the Digital Fellows (DF) Project was intended to foster and support the appropriate use of digital pedagogical resources in gateway courses. Central to this initiative has been the goal of enhancing the leadership role of the provost/CAO in the campus strategy for and implementation of digital pedagogy. The emphasis on gateway courses occurs as part of larger institutional efforts focused on student success – enhanced student learning and improved retention and graduation rates – particularly among low-income, first generation, and minority students.

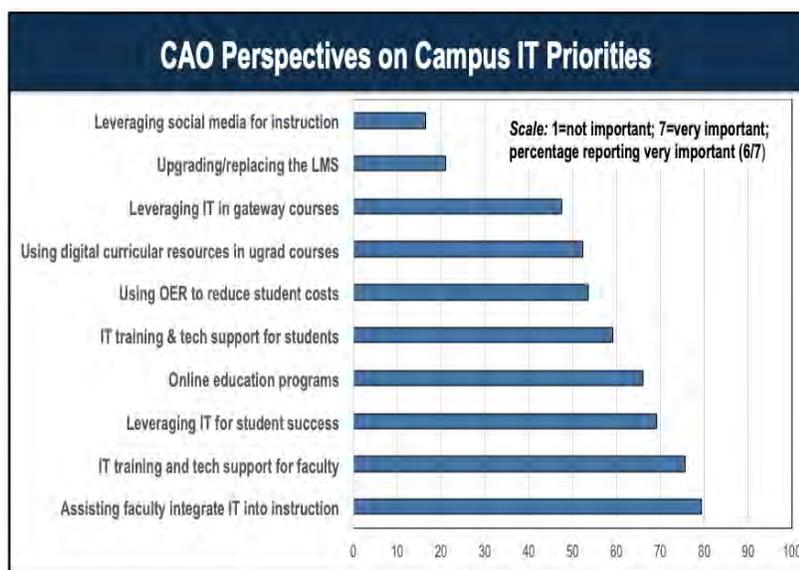
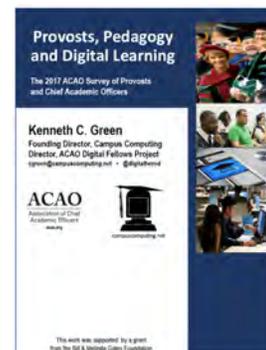
Following the selection of 31 Digital Fellows in June 2017, workshops in summer and fall 2017, and the launch of campus pilot projects in winter 2018, it is now appropriate to ask (a) what do we know about CAOs and digital pedagogy, and (b) what have the 31 CAOs participating in the ACAO Digital Fellows Project learned about the challenges of deploying digital pedagogical resources to improve student learning and student success in gateway courses? What insights emerge about digital pedagogy, deployment strategies, faculty engagement, and scaling from the experiences of the 31 CAO Digital Fellows?

What follows here are the first data from the DF project about provosts, faculty, and digital pedagogy. This interim report from the Digital Fellows Project draws on two sources: (a) a national survey of CAOs and digital pedagogy conducted in fall 2017, and (b) the interim (year one) reports from the 31 CAOs selected as Digital Fellows about the gateway course initiatives at their institutions and the challenges and benefits of “going digital.”

## Provosts, Pedagogy and Digital Learning: The Fall 2017 ACAO Survey

As part of the Digital Fellows Project, ACAO launched a national survey of CAOs, focused on digital pedagogy and provost/CAO engagement in the development of curricular and related strategies intended to promote the effective use of digital pedagogies in undergraduate education. The fall 2017 survey population targeted some 2,100 CAOs at public and private, non-profit college and universities that enrolled more than 1,000 students; 359 CAOs participated in the survey. (Private, non-profit two-year colleges were not included in the survey population.) The full results of the fall 2017 *Provosts, Pedagogy, and Digital Learning Survey* are [available here](#).

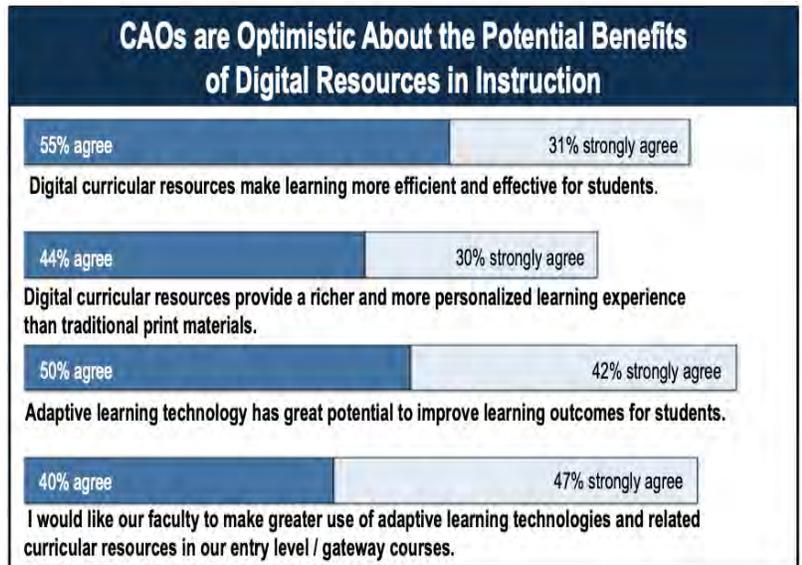
The fall 2017 survey data reveal that CAO’s top IT priorities clearly focus on instruction, tech training and support for faculty, and leveraging IT for student success. But interestingly, the CAO focus on instruction seems more generalized (or generic) than targeted: almost fourth-fifths (79 percent) of the survey participants identified “the instructional integration of information technology” as a top institutional priority. However, smaller numbers endorsed more specific “going digital” strategies: just over half (52 percent) said a top IT priority was “using digital curricular resources in undergraduate courses” and than just under half (47 percent) identified “leveraging IT in gateway courses.” The gap (about 25-30 percentage points) between the general support for “the instructional integration of IT” and more specific implementation strategies (digital curricular resources and a focus on gateway courses) may



reflect less direct knowledge about the specific digital pedagogical strategies, options, and interventions on the part of many CAOs.

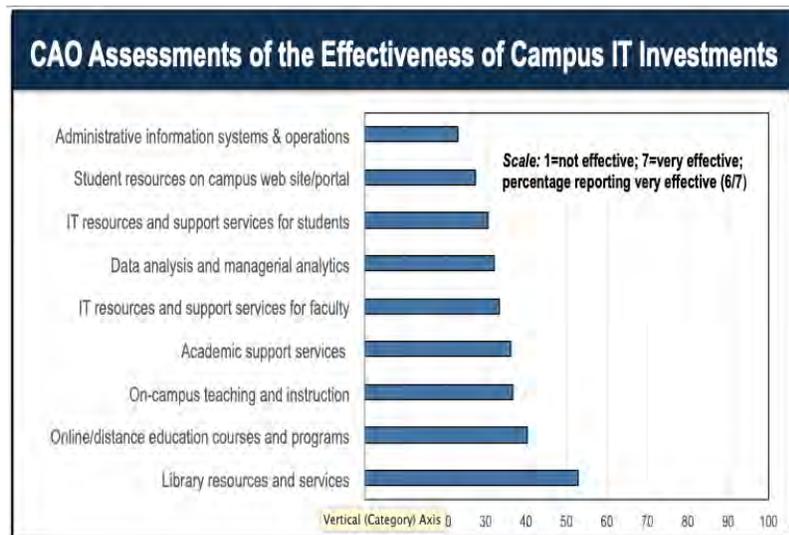
That “leveraging IT for student success” (69 percent) ranks highly (third) among CAOs is not surprising. The IT initiatives linked to student success initiatives cover a range of academic, support service, and analytical activities and services, almost all of which are typically part of the academic and operational domain of CAOs.

The fall 2017 survey also revealed that CAOs at the nation’s two- and four-year colleges and universities are very optimistic about the potential of digital learning resources to enhance and transform the learning experience of undergraduates. CAOs overwhelmingly affirm that “digital learning resources make learning more efficient and effective for students” (86 percent agree/strongly agree) and that “adaptive learning technology has great potential to improve learning outcomes for students” (92 percent agree/strongly agree). Almost 90 percent would like to see their faculty make greater use of adaptive learning technologies in entry level and gateway courses.



However, CAOs are far less effusive about the benefits of technology when asked to assess the effective-ness of current campus investments in IT resources and the general campus satisfaction with key IT applications and services. The highest rated resources and services are the campus investments in library systems, online education, on-campus teaching, and academic support services, and faculty support services.

In contrast are the four “investments” that get the lowest ratings from CAOs for being “very effective:” administrative information systems, students resources on the campus web site/portal, IT resources and support for students, and data analytics. Admittedly, the gap is not large between the higher rated items, and the survey means and medians on these items higher and lower rated items may be close. Too, the disbursement (rankings 1-7) may suggest that CAOs view all these items as “ok or adequate,” but not exceptional. Still, the four lowest rated items are key *infrastructure* resources for administrators (administrative systems and analytics) and for students (online resources and IT support services).



It is important to place these data in a broader context. Across all sectors of higher education and regardless of their home disciplines, today’s CAOs have come of age personally, professionally, and professorially with the technologies that are now ubiquitous in the consumer market and on campus. In aggregate, the survey data presented above and in the [2017 survey report](#) suggest that CAOs have great faith in the power of information technology and digital course resources to transform the student learning experience. At the same time, the survey highlights important questions about how CAOs assess, to date, the effectiveness of campus investments in IT for instruction and operations, and also the current campus level of satisfaction with key IT resources and services.

## The ACAO Digital Fellows Project: Provosts and Digital Pedagogy

With generous support from the Bill & Melinda Gates Foundation, the [ACAO Digital Fellows Program](#) launched in January 2017. The 31 CAO Fellows were selected from a national competition in June 2017.

The first year of the Fellowship Program was marked by workshops in summer and fall 2017, and the launch of campus pilot projects in winter 2018. Across the 31 participating institutions, the DF project was the catalyst for the mid-academic year launch of 84 new or significantly modified gateway courses. These mid-year course initiatives involved 103 faculty and some 7,500 students. Many of the new or revised gateway courses launched at the participating DF institutions involved an initial campus deployment of adaptive learning technologies. (Mid-year launches of new or redesigned courses are, understandably, both challenging and significant!)

### ACAO Digital Fellows Program

[acao.org/digitalfellows](http://acao.org/digitalfellows)

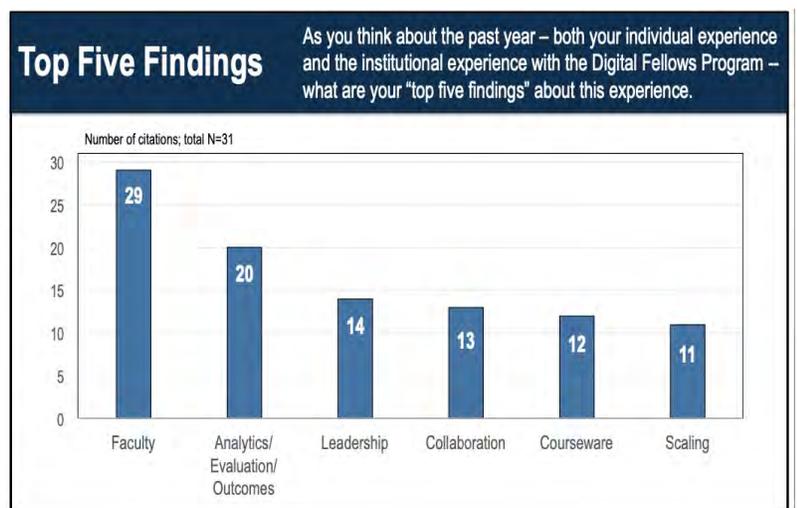


<p>Focus on the potential benefits of digital pedagogy (and esp. adaptive learning technologies) on student performance in gateway courses.</p> <ul style="list-style-type: none"> <li>• CAO leadership</li> <li>• Faculty engagement</li> <li>• Evidence of impact</li> <li>• Scaling at and beyond 31 project campuses</li> </ul>	<ul style="list-style-type: none"> <li>• Ashford University</li> <li>• Athens State University</li> <li>• Austin Community College</li> <li>• Bunker Hill Com. College</li> <li>• Clark Atlanta University</li> <li>• Central State University</li> <li>• Colorado Technical Univ.</li> <li>• Davidson County Comm. College</li> <li>• Gallaudet University</li> <li>• Georgia Highlands Univ.</li> <li>• El Segundo College</li> <li>• Hofstra University</li> <li>• Indiana U-Purdue U-Indianapolis.</li> <li>• Laredo Community College</li> <li>• North Dakota State Univ.</li> </ul>	<ul style="list-style-type: none"> <li>• Nova Southeastern University</li> <li>• Potomac State College</li> <li>• Richard Bland College</li> <li>• Saint Martin's University</li> <li>• Seattle Central College</li> <li>• Shippensburg University</li> <li>• Texas A &amp; M, Kingsville</li> <li>• University of Alaska Southeast</li> <li>• University of Central Florida</li> <li>• University of Maine</li> <li>• University of Nevada, Las Vegas</li> <li>• Univ. of North Carolina, Charlotte</li> <li>• University of North Carolina, System Office</li> <li>• University of Pikeville</li> <li>• Winona State University</li> <li>• Zane State University</li> </ul>
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Six months after the launch of the campus projects (and ahead of a July 2018 project workshop), the 31 CAOs/Digital Fellows were asked to report what they had learned about “digital learning” and the opportunities, challenges, and potential benefits of deploying digital pedagogical resources to improve student learning, student retention, and student success in gateway courses. As part of on-going project evaluation activities, the fellowship participants were asked to share what insights emerged from their “year one” experience in the DF program about digital pedagogy, deployment strategies, faculty engagement, and scaling digital initiatives.

Specifically, the CAOs were asked to think about their individual and institutional experience over the past year (June 2017-2018), and to identify their “top five findings” about the “going digital” initiatives at their institutions and the overall Digital Fellows experience. Perhaps not surprisingly, many of the issues the 31 DFs cite among their “top five findings” about the institutional and personal experiences align with the CAO priorities identified the fall 2017 ACAO Survey of CAOs.

The summary data from the open responses of the 31 CAO Digital Fellows reveal that the leading “finding” among the top five issues focused on faculty issues, including faculty buy in, engagement, collaboration, cooperation, training, and also recognition and reward, were cited by almost all the program participants. Analytics/Evaluation/Outcomes emerged as a distant second, followed by a “near tie” for third among leadership, collaboration, courseware, and scaling. The narrative that follows focuses the CAO comments and experience in the DF program.



### The Focus on Faculty

For a project intended to promote the use of digital pedagogies, the focus on faculty, rather an emphasis on courseware, might seem surprising. Following the arrival of the first IBM-PCs and Macs on college campuses

in the mid-1980s and the continuing campus quest to integrate technology into instruction, much of planning and policy conversation about “going digital” and the making greater (or better) use of technology resources in the postsecondary curriculum has focused on the technology resources and tools.

Yet the CAO comments in their Year One reports affirm the central role of faculty engagement and support as essential to the effective deployment of digital pedagogy and, by extension, the effective (and often long-overdue) curricular redesign of critical undergraduate gateway courses. The CAO comments below, taken verbatim from their individual campus reports, highlight the importance of faculty issues.

- The use of digital technology needs to be faculty driven. The faculty members need to want to use the project and to improve student success. They need to be invested in the project and to be successful on a large scale, it needs to be a department decision.
- Digital pedagogy is a foundational part of education that needs to be built into all faculty development programs from new to seasoned faculty representing all disciplines.
- Our faculty have told us they more robust training on the courseware itself as well as adequate time to integrate digital adaptive courseware into their gateway courses. They report that some of the challenges they have encountered include balancing the use of digital adaptive courseware with in-class activities and adaptive the course for different rates of student mastery.
- There is a significant [and surprising] amount of untapped interest among faculty in engaging with Digital Pedagogy, both in terms of course redesign and in using analytics to better understand student behavior as it affects retention and graduation.
- It’s critical to cultivate a trusting relationship with a faculty champion (or champions) who have sufficient power within the school/department to lead change.
- Faculty are generally isolated from pedagogically sound digital courseware products and developments. Their primary exposure to digital courseware is often through vendor advertisements and salespeople.
- Designing and developing innovative course material that shifts from the customary delivery of instruction can occur successfully when faculty are supported through instructional design personnel, professional development credit, monetary incentives, administrative involvement, and when the penalty for failure is removed.
- Do not short-change faculty development and support services. Faculty may be disciplinary subject matter experts, but they need the assistance of instructional designers, media developers, and other digital learning professionals to realize the best possible outcomes for their technology-enabled course redesigns.

These comments cover a wide range of critical faculty issues: faculty raining and continuing support, uncertainty about and untapped interest in digital pedagogies; the role and importance of faculty champions; and the relationship between faculty and instructional design personnel and campus TLT centers.

These comments also suggest that the ACAO Digital Fellows, drawing on their recent individual and institutional Fellowship experiences, are now prepared to engage with their CAO colleagues at other institutions about the primacy of faculty engagement and involvement in institutional efforts to leverage the potential benefits of appropriate digital pedagogies in gateway courses.

### **Analytics, Evaluation and Outcomes**

Questions about analytics and evaluation are particularly important in discussions about curricular innovation and reform. Too often curricular choices and decisions about supporting pedagogical and technology resources are influenced by opinion, enthusiasm, advocacy, and epiphany, rather than any empirical evidence of impact and outcomes. Consequently the “*does it really work*” question (and, by extension, “*could it work here with our students?*”) remains a critical issue in the continuing campus conversations about the instructional integration of information technology and the deployment of digital pedagogies in gateway (and other) courses.

CAO comments (below) reflect their concerns about data and analytics. What in theory should be a somewhat direct and linear task – developing a research design for a classroom intervention, agreeing on and collecting appropriate data, and then analyzing the data – is often surprisingly complex. And it may also be a bureaucratic challenge or subject to campus politics (and personalities). Moreover, evaluation efforts often

take longer than anticipated, meaning that reliable data and the necessary evaluation narrative are not presented in a timely manner, which can impede future planning, decision-making, and deployment efforts.

As with their comments about faculty issues, the CAO comments below are both informative and compelling, but perhaps not surprising:

- Assessment and data analysis take longer than anticipated. I had hoped to have hard data by now, but that will probably not be available from IR for another week or two.
- We were surprised at how time-consuming it is to track the progress and outcomes with high resolution for each student as part of the data analysis.

A second data/outcomes assessment challenge is often the absence of “hard evidence” about specific applications and interventions. We know that faculty act out of enlightened self-interest: faculty want (need!) a compelling reason to change current practices, and not surprisingly, may request “real research” documenting the impact of a proposed pedagogical application or intervention. Although the research literature on adaptive applications, in particular, is growing, adaptive technologies are still, in many ways, early (and often immature) technologies. No surprise then that some faculty may be suspicious about the quality of the campus reports or published research endorsing adaptive and other tech-based pedagogical innovations, especially as so much of the technology (and some of the research literature) comes from commercial providers rather than campus colleagues, faculty researchers, and institutional research organizations:

- While there are good arguments based on learning theory for the use of adaptive tools, at present there is insufficient rigorous data on the effective use of specific adaptive tools to be convincing to faculty in many areas to invest the time and energy needed to make a change in their pedagogy.

But “rigorous” data alone may not be sufficient. For many wavering or ambivalent faculty, presenting data that document the effectiveness of digital pedagogies may need to be part of a larger, compelling, “data driven, first person” narrative from one or more colleagues. One CAO cited a specific experience with one of her faculty colleagues involved in a course design initiative:

- Data are important, but old ideas die hard. The reluctant faculty member is often convinced, despite national research and data, that his approach to teaching introductory math courses is state of the art and is the best we can do. I think I should have approached him with both data and stories, rather than just data.

These last two comments highlight the role of data, as resource, that can inform and foster best (or better) practices. And based on the comments above, CAOs acknowledge that they need compelling narratives that draw on data, credible research, and (often) the experience of peers, as necessary catalysts for change.

## Leadership and Culture

James G. Ptaszynski, formerly a senior fellow at the Gates Foundation (and now the vice president for digital learning for the University of North Carolina System) reports that the *2015 Chronicle of Higher Education* article titled [“The Path Change Runs Thorough the Provost’s Office”](#) was one of several catalysts for the development of the Digital Fellows Program. As noted above, “if a campus is going to pursue new priorities, fix systemic problems, or adopt innovation on a broad scale, a provost will most likely be directing the charge. To do that, the provost has to listen, inform, discuss, and persuade, engaging people from all corners of campus.”

Given the Gates Foundation’s interest and investment in the effective deployment of digital pedagogies to improve student learning and student success, it is not surprising that the *2015 Chronicle* article was instrumental in the development of the Digital Fellows initiative. Whereas the Foundation’s other postsecondary digital initiatives often have had a more programmatic orientation, the Digital Fellows project was designed to explore and support the role and impact of campus leadership – provosts and chief academic officers – in advancing the appropriate use of digital pedagogies in gateway courses.

So, then, what did the CAOs learn during the Year One of the Digital Fellows Project about the role of leadership in fostering curricular innovation and the appropriate deployment of digital pedagogies in gateway courses? The CAO comments clearly articulate the essential role of academic leadership:

- Leadership at the top makes a difference. When the leadership of an institution generates a shared creative vision that is realized through the sustained integration of planning, resourcing, and assessing, innovation in digital learning can take place on a significant scale. This take away was perhaps best illustrated during our visit to EdPlus at Arizona State University. Clearly, the people in top leadership, with President Michael Crow at the apex, are indispensable to systematic and sustained change of significant magnitude.
- We find that while there are faculty who are anxious and excited about the exploration and integration of technology, large-scale, high-impact implementations require the buy-in of faculty leadership at the department chair or dean level, to fully deploy. We need to find better ways of not only having their support of innovative faculty, but also for them to build knowledge and skills in this area.
- To effectuate change, there is a need to establish publicly an intended goal and incorporate into the overall university outcomes or compelling priorities as a strategic goal to be supported by effort, intent, resources and the willingness to expand beyond a comfort zone. Never, never assume that faculty will never buy into the intended goal. It should not be presented as a top down initiative's, allow faculty to own the project and that as such is part of the responsibilities they must expand their scholarship of teaching and learning.
- Creating an environment in which faculty and staff are encouraged to take calculated risks to support student learning also creates a culture of innovation and improvement, where faculty can experiment with new approaches without fear of reprisal if attempts do not yield favorable results.
- A key question for the leadership about robust support for the advancement of digital learning and pedagogies involves not only the faculty but also all who play satellite roles in such advancement. If an institution does not, for example, provide the services and support of a Center for Faculty Excellence in Teaching and Learning, then the institution's leadership must surely examine its own conscience on the subject of sufficient support for faculty development.
- Incorporating the DF project into a larger campus wide movement yields higher buy in. Our Digital Innovation Movement that brought together the whole university campus versus only academic departments. The movement transcended divisions to create a culture of innovation that capitalized on the digital technology that was already in place, but in smaller clusters around campus. By unifying the message, the university was able to collectively move a digital agenda forward.
- You must make a long-term commitment. Weather the early failures, commit the resources necessary, including funding, and stay the course.

Conversations with the 31 ACAO Digital Fellows following the launch of campus projects in winter 2018, plus the comments in their Year One reports, make it clear that the CAOs involved in the DF Program have both a new understanding about the power and potential of digital pedagogical resources in gateway courses, and a firm resolve to “stay the course” to advance the appropriate use of digital pedagogical resources.

### **Courseware**

For many of the CAOs and faculty involved in the Digital Fellows Project, courseware – and specifically adaptive learning platforms – were a “journey of discovery.” Some faculty and institutions had prior experience with various subject-specific instructional resources that were either developed on campus (or at another institution) or developed and promoted by commercial providers, including textbook publishers.

The courseware experience fostered excitement, and also anger and angst. No one application was “perfect.” Some interesting applications were, at best an “80 percent solution” for various campus pilot projects. Moreover, as one CAO noted, “in order to implement courseware [effectively], course redesign is necessary; for some faculty this was a challenge.” In other words, tinkering at the margins with a supplemental digital application or platform may be a deployment strategy that is doomed to fail – or at least fall far short of expectations. The nature and potential of the emerging digital platforms and resources implicitly require a larger effort at course redesign, rather than just minor or supplemental “retooling.”

Many of the DF campuses experienced anywhere from modest to significant success with their pilot projects as measured by course retention, reduced in DFWs, and other metrics. Yet in conversation and in comments on their Year One reports, the CAOs (often echoing their faculty), expressed clear concerns about impact, productivity, costs, and accessibility, as noted below:

- Some faculty new to the digital teaching environment are not fully aware of the impact, positive or negative, that digital learning tools can have on students.
- Stacking digital courseware costs onto existing courses increases cost per credit hour. The most desired courseware were products that were tailored to specific disciplines and course levels. Even for courseware that could be adopted across many academic levels and disciplines, the courseware added costs onto the course's existing instructional cost structure. These increases were sometimes added as lab fees or as textbook costs.
- A challenge to scaling adaptive learning to support an access and completion mission is the pricing model used by publishers and vendors. They all continue to demand a "price per student" as if the service they provide had the same production costs as paper textbook publishing. That continues to place the cost of adoption on the students and presents restrictions on how flexible our offerings can be. With adaptive learning software, we could have more flexible academic terms.
- Most of the digital courseware my faculty and I identified did not scale to increase faculty productivity. That is, they did not increase the number of students taught per faculty per course, or reduce the cost per credit hour of instruction. While we believe that much of the courseware improved learning and facilitated greater student success, we did not see greater faculty/student productivity increases. Using digital courseware added cost to someone's budget without reducing cost per credit hour of instruction.
- Accessibility vetting must be done far in advance for software selection. One of the main obstacles that was encountered in content innovation was the procurement of software. The primary reason behind that delay was the need for a Volunteer Product Accessibility Template (VPATs). VPATs are critical as we strive to introduce a universal design for learning strategy in any digital pedagogies employed. The process however, is a lengthy one as it pushes vendors to sometimes make extreme modifications to their products when they are not able to.

### The Macro Issue: So What is Digital Learning?

Despite the explicit project focus on digital learning and pedagogical resources, some members of the DF group express continued to express uncertainty about the multiple meanings and multiple dimensions of *digital learning*:

- *Does anyone know what Digital Learning really means?* Perhaps the biggest "aha" resulting from this experience is the recognition that there continues to be little clarity in what is understood when educators, both faculty and administrators, discuss digital learning.

The official definitions for (or explanations of) digital learning and digital learning often appear laden with jargon and may seem far removed from the real instructional experiences and classroom concerns of faculty and academic leaders. For some, the attempt to incorporate official (or referenced) definitions about "digital learning" into policy papers and campus plans served as a reminder of Supreme Court Justice Potter Stewart's widely cited 1964 comment about of pornography: I can't define it, but I know it when I see it.

At one level, many of us can identify resources and experiences that seem to define digital learning. For example, the campus LMS is not an example of digital learning; rather, it is an application or platform for organizing course resources. In contrast, a scientific simulation or adaptive learning tutorial probably would qualify as a digital learning experience.

What Is Digital Courseware?		
<p>Digital courseware is a solution with the potential to support student-centered learning at scale in postsecondary education. While millions of students use digital courseware today in their college courses, significant opportunity remains for effective digital courseware use to support new teaching and learning strategies, improve course accessibility, and drive improvements in learning outcomes for postsecondary students.</p> <p>Courseware in Context</p>	<p>Digital courseware is instructional content that is scoped and sequenced to support delivery of an entire course through purpose-built software. It includes assessment to inform personalization of instruction and is equipped for adoption across a range of institutional types and learning environments.</p> <p>Online Learning Consortium</p>	<p><b>I cannot define it, but I know it when I see it.</b></p>  <p><b>Justice Potter Stewart</b> Jacobellis v. Ohio (1964)</p>

But these are just parts – in some ways only small components – of a much larger *gestalt* in which the whole learning experience should be more than just the sum of the (digital and other) parts. One CAO clearly articulated the critical importance of the what we might call the *digital learning gestalt*:

- The most significant learning experience for me has been the development of a more sophisticated understanding of what “digital learning” and “courseware” mean. More than simply providing me an expanded vocabulary, the experience has helped me to understand that sophisticated use of digital pedagogy is not using digital tools to mimic traditional classroom instruction. Sophisticated use involves changing the way students learn inside and outside of the classroom. Digital tools including can foster deeper levels of learning. They can facilitate the individualization of instruction even in large section classes and provide opportunities to intervene earlier and more effectively with students who are struggling.

### **Project Outcomes – A Preliminary Accounting**

What then were the identifiable outcomes of Year One of the Digital Fellows Project? A compressed list of Year One Year achievements following the selection of the Fellowship recipients (in June 2017) and seven months after the (mid-academic calendar year) launch of 31 campus pilot projects is, in itself, impressive: 84 courses involving 103 faculty and some 7500 students at 31 institutions. The preliminary campus evaluation data suggest that many of these pilot projects saw gains on various traditional metrics for student learning and outcomes: higher course completion rates, lower DFWI numbers, etc. But these course numbers provide only a top-level overview of short-term impact and benefits.

A second set of metrics might focus on the financial ROI for this initiative. At many of the participating institutions, modest campus grants (\$6,000) to support mid-year pilot projects that launched in January 2018 were a catalyst for significant additional investments of personnel and financial resources. A preliminary estimate in summer 2018 suggests that that the Digital Fellows project generated an additional \$8.1 million in new institutional commitments to support course redesign and campus investments in digital learning across the 31 DF campuses.

Scaling represents a third set of metrics for the DF initiative. All 31 institutions participating in the Digital Fellows Project have clear plans to expand their digital pedagogy pilot projects to more courses and additional departments. The success of the initial pilots has generated interest among other faculty, and led CAOs and department chairs to commit money and personnel to support course redesign and deploy various digital pedagogical applications.

And for the 31 CAO fellowship program participants, one year into the Digital Fellowship experience clearly resulted in:

- a broader, deeper, and more sophisticated understanding about the potential benefits and the potential challenges involved with digital pedagogical resources;
- a new (or renewed) appreciation and deeper understanding for the critical role of faculty in course and curricular redesign intended to foster student success; and
- a new (or renewed) appreciation for the critical role of the provost/CAO in supporting curricular innovation. CAOs report their (often new or renewed) willingness to “stand up and stand with faculty” who were interested in curricular innovation and digital pedagogies was a critical signaling mechanism to deans, department chairs, to faculty, and other senior campus officials.

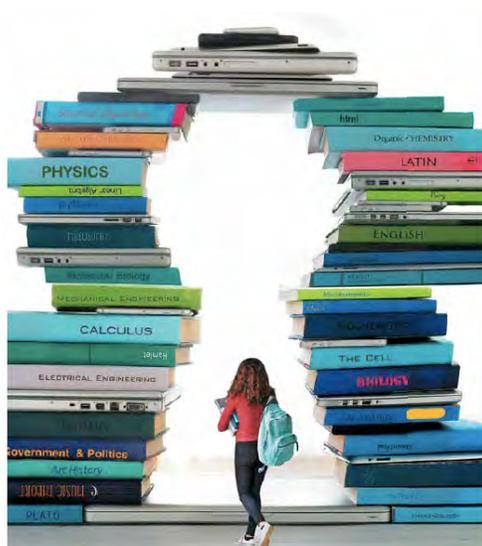
The DF Program’s final report (scheduled for release in fall 2019) will provide additional campus data, project metrics, and a project narrative documenting the impact of the institutional pilot projects and the overall impact of Digital Fellows Program. But even with the benefit of additional data from the final campus and project report, it still may too early to assess the DF Program’s longer-term impact and benefits on the students, faculty, institutions, and CAOs participating in this initiative. The long-term impact DF Program, lance din January 2017, may be more readily apparent in three-five years (by 2020-2022).



## HOW PERSONALIZED LEARNING

# Unlocks Student Success

By Nazeema Alli, Rahim Rajan, and Greg Ratliff



Over the past few decades, the profile of the typical college/university student has changed dramatically. Higher education needs to evolve as well. Members of today's new student majority—including students from low-income backgrounds, first-generation college-goers, students over the age of twenty-five, and students of color—demand a learning environment that is more *personalized*.

That is, they require learning that is more specific to their individual needs and goals.

Fortunately, technology provides educators and administrators with tools that can tailor the learning experience to the individual, help at-risk students master core skills, and develop guided pathways that assess students' progress toward graduation and suggest interventions if challenges arise along the way. Although much must be done in order to implement the needed changes for personalized learning, the vision and evidence for unlocking student success drives us forward.



### Why College?

Completing a postsecondary program has never been more important—both to whether a student will thrive or struggle and to whether the U.S. economy will grow or stagnate. Students with a postsecondary credential or degree are more likely to be healthy, employed, and civically engaged. With each step of the educational ladder they complete, their average earnings also increase.<sup>1</sup>

By 2020, 65 percent of all jobs in the United States will require a postsecondary credential. Yet in 2013, only about 40 percent of working-age Americans had one.<sup>2</sup> Consequently, colleges and universities are under intense pressure to increase retention and completion rates.

At the same time, today's students come from diverse backgrounds, face unique challenges, and often juggle numerous responsibilities in addition to their studies:

- 40 percent are over the age of twenty-five.
- Nearly 40 percent are the first in their family to go to college.
- 40 percent of full-time students and 76 percent of part-time students work while going to college.
- 38 percent are part-time students.
- 26 percent are raising dependent children.<sup>3</sup>

This increasingly varied student population makes it more important than ever to ensure that those of us in higher education not only are helping students complete their higher education but also are doing everything we can so that colleges and universities are ready to meet the needs of today's students.

### Getting to and through College

Enrollment in postsecondary education has grown by more than 50 percent over

the last twenty-five years. However, over the past twenty years, more than 31 million Americans—15 percent of today's working-age population—left college without earning a certificate or degree, and millions more are dropping out every year.<sup>4</sup>

According to ACT, freshman/sophomore-year retention rates range from 55 percent (for two-year colleges) to 64 percent (for non-selective four-year institutions).<sup>5</sup> And according to the National Center for Education Statistics (NCES), the completion rate for first-time, full-time undergraduate students who began their pursuit of a certificate or associate's degree in fall 2010 was just 29 percent. The completion rate for first-time, full-time students who began seeking a bachelor's degree in fall 2007 was 59 percent.<sup>6</sup> These statistics are troubling, and unless they change significantly, the U.S. economy will face a shortage of workers with postsecondary education.

Unfortunately, one of the strongest predictors of whether a student will complete a degree or certificate is not his or her intelligence, test scores, or grit, but family income.<sup>7</sup> The hard truth is that although higher education has unique potential to be a bridge to opportunity and the middle class, it too often serves as a barrier.

The goal of the Bill & Melinda Gates Foundation is to ensure that students complete a postsecondary program that helps them support themselves, engage in their communities, and achieve their dreams. Our partners and grantees are tackling the challenge of how best to adapt to the new student majority. Their research shows that personalized learning can help students, especially underserved students, complete a certificate or degree.

### What Is Personalized Learning?

Rather than trying to apply a one-size-fits-all approach to education, personalized learning offers students an individualized approach that is specific to their preexisting knowledge, learning needs, and goals. Students learn best when their education is targeted and

tailored to them.<sup>8</sup> Examples of personalized learning activities that have been demonstrated to improve student outcomes include:

- adapting the scope of instruction based on assessments of students' existing knowledge, skills, and gaps;
- using personalized hints or prompts that support students during learning activities or assessment items;
- prompting learners to generate explanations of how they have approached an activity (e.g., “show work”);
- employing algorithms that adapt the presentation of content based on relevance to learners' goals; and
- adapting the complexity or presentation of content based on a student's learning.

What if all of higher education had a strong culture of continuous innovation focused on adaptive learning experiences responsive to individual learners' goals? What if new, innovative tools could make personalized education not only effective in terms of learning outcomes but also economically feasible?

Imagine that remedial and general education programs are personalized to suit the prior knowledge, skills, and personal interests of each student. In place of large, anonymous lecture classes where many first-generation and low-income students struggle, students could instead participate in interactive, blended courses where they would have access to continuously improving content, adaptive simulations, problem sets, and assessments.<sup>10</sup>

tional experience. Advisors and faculty would also use these tools to see where students are struggling and where they are succeeding, allowing the advisors to make real-time adjustments, deploy critical learning interventions, and apply increased or different supports based on the needs of each student.

#### *Personalized Learning Today*

The good news is that this world of innovative personalized learning interventions already exists. The capabilities are out there, and once they are adopted by more higher education institutions, more students will receive a personalized education and be able to reach their full potential. Technologies that boost the development of student-centered pathways, improve student

supports with predictive analytics, and improve learning outcomes are emerging at postsecondary institutions around the nation. In addition, a growing body of evidence is demonstrating that new technologies can personalize learning at an unprecedented scale.<sup>11</sup> At the foundation, we are working to accelerate the development of these technologies and to increase an understanding of how they can be used by faculty and advisors to help students achieve greater success on their way to a credential. From our

grantees and research, we've learned that when at-risk students take high-quality blended courses (i.e., a combination of in-class and online courses) they can master the same amount of content in half the amount of time. We've also seen pass rates for at-risk students increase by one-third in blended courses.<sup>12</sup>

#### *Digital Courseware*

Within personalized learning, digital courseware is a powerful lever to increase accessibility and affordability for students. The foundation partners with learning education technology organizations and colleges/universities to develop and scale the adoption of next generation digital courseware



Research shows that powerful new teaching, learning, and advising tools can help advisors and educators to be more personalized in how they instruct and advise students.

Research shows that powerful new teaching, learning, and advising tools can help advisors and educators to be more personalized in how they instruct and advise students.<sup>9</sup> A personalized learning approach and environment can engage students and provide timely feedback and robust student supports. This higher-quality teaching and advising can result in greater retention and in higher rates of program completion.

#### *“Good” Personalized Learning*

Imagine that students everywhere are able to receive the most effective adaptive instruction at a reasonable price, using technologies and resources that tailor the learning to the individual.

Imagine that instead of an emphasis on lectures, the entire higher education system devotes time and attention to helping students achieve fluency and mastery through greater one-on-one tutoring, targeted group instruction, peer support, and other resources. In such an environment, students could take ownership of their learning and achieve mastery at their own pace.

Imagine that compelling personalization tools and advising applications are readily available to all students so that they can track their progress and achieve their individual goals. These tools would serve as personalized maps that motivate and guide students along every juncture of their postsecondary educa-

**FIGURE 1. Features Associated with More Positive Effects on Learning**

<b>1. Breadth</b>	Effects were greater for projects either designing or redesigning an entire course than for those developing supplemental resources or early alert systems.
<b>2. Field of use</b>	Effect estimates were greater for projects implemented mainly in community colleges than in 4-year colleges.
<b>3. Learners' preparation level</b>	Effects were greater for projects targeting students with weak rather than moderate or advanced preparation.
<b>4. Subject area</b>	Mathematics courses had more positive effect estimates than courses in other subject areas.
<b>5. Student:instructor ratio</b>	Courses of medium enrollment size had more positive effects than the smallest and largest courses.
<b>6. Pacing</b>	Effects were larger for self-paced courses than for classes using cohort pacing or a mix of cohort and individualized pacing.
<b>7. Dominant student role</b>	Courseware in which the student's role was working on problems or answering questions had more positive effects than those where most time online was devoted to reading or listening to a video lecture.
<b>8. Individualized</b>	Courseware individualizing instruction on the basis of student performance on embedded assessments had more positive effects than those offering individualization based on student choice or no individualization.
<b>9. Mastery based</b>	Courseware determining when students are ready for new material by applying a standard of mastery had stronger learning effects than courseware allowing students to choose their own learning paths.
<b>10. Adaptive technology</b>	Learning systems that adapt to the individual learner had large learning impact estimates.
<b>11. Modality</b>	Effects tended to be more positive for courses using a blended learning model with more than half of the instruction occurring online.

Source: Barbara Means, Vanessa Peters, and Ying Zheng, *Lessons from Five Years of Funding Digital Courseware*, exhibit 12. Reprinted with permission.

that delivers personalized learning. Through our Next Generation Courseware Challenge,<sup>13</sup> we are funding high-quality courseware solutions to help low-income students succeed in high-enrollment general education courses, where they often struggle.<sup>14</sup>

*Adaptive Courseware*

While the available evidence shows that adaptive digital courseware can yield better outcomes for learners, it also points to the possibility that these innovations may assist in reducing instructional costs by unlocking the potential of accelerated course completion.<sup>15</sup> Research also has been able to identify where and how adaptive learning can have the biggest impact (see figure 1),

so that institutions and policymakers can make the most of their resources for increasing student success.

*Integrated Planning and Advising for Student Success*

Integrated Planning and Advising for Student Success (iPASS) gives students and administrators the data and information they need to plot a course toward a credential or degree, along with the ongoing assessments and nudges necessary to stay on course toward graduation. iPASS combines advising, degree planning, alerts, and interventions to help students navigate the path to a credential. These tools draw on predictive analytics to help counselors and advisors determine in advance whether a student

is at risk of dropping or failing out, and it can help assist students in selecting courses (see figure 2).

Multiple studies have documented the impact that these types of tools can have on student success. “The Effects of Student Coaching in College” report found a 4 percentage point gain in completion from interventions such as iPASS—and often at lower cost than other types of interventions.<sup>16</sup> iPASS has also improved student success at early innovators like Arizona State University, which saw its graduation rate increase by 11.6 percentage points.<sup>17</sup> Furthermore, results from the first round of iPASS programs demonstrate an increase in full-time enrollment, which research finds leads to a greater likelihood of college competition.<sup>18</sup> Finally, the use of iPASS is tied to stronger advisor engagement, higher-quality data to guide and inform student plans, and increased likelihood of student success.<sup>19</sup>

One example of iPASS is Degree Map at Austin Community College (ACC). In 2011, ACC transitioned from an all-paper advising process to an e-advising system, in an effort to better track progress and conversations for its students. With Degree Map, students are engaged and

**FIGURE 2. iPASS Taxonomy**

CHANGE MANAGEMENT		
STUDENT & INSTITUTION DATA		
ANALYTICS & REPORTING		
STUDENT PLANNING TOOLS	INSTITUTIONAL TOOLS	STUDENT SERVICES
Degree Audit & Planning	Diagnostics	Academic Tutoring
Transfer Articulation	Alerts	Coaching & Advising
	Tutor & Advisor Management	Resource Connection

Source: Gates Bryant, “Driving Toward a Degree: The Evolution of Planning and Advising in Higher Education,” Tyton Partners paper, August 28, 2015, p. 9. Reprinted with permission.

**FIGURE 3. Norris/Baer Framework: Optimizing Student Success through Analytics**

ELEMENTS	DESCRIPTION	EXAMPLES
<b>1. Manage the student pipeline</b>	Scientifically refine strategic enrollment management of the student pipeline.	<ul style="list-style-type: none"> <li>Use data mining and predictive analytics to improve the recruitment, admission, and enrollment of entering students (raise numbers) and improve chances of student success; and</li> <li>Use longitudinal and predictive analytics to craft policies for improving success of <i>at-risk students</i>.</li> </ul>
<b>2. Eliminate impediments to retention and student success</b>	Eliminate structural, policy, and programmatic impediments to retention and success.	<ul style="list-style-type: none"> <li>Use analytics to support <i>comprehensive</i> first-year programs;</li> <li>Eliminate bottlenecks in courses and program progressions; unreasonable pre-requisites and other requirements; and</li> <li>Use predictive analytics to shape policies and practices to enhance retention in sophomore-senior years.</li> </ul>
<b>3. Utilize dynamic, predictive analytics to respond to at-risk behavior</b>	Embed analytics in academic and administrative support processes to enable real-time interventions dealing with at-risk behaviors, both academic and co-curricular.	<ul style="list-style-type: none"> <li>Use dynamic, predictive analytics to determine at-risk behavior in courses early in the semester;</li> <li>Embed predictive analytics in processes; and</li> <li>Monitor levels of student engagement in academic and co-curricular activities and intervene with students who can be saved.</li> </ul>
<b>4. Evolve learner relationship management systems</b>	Build tracking systems that can track and manage the many facets of learner progress and identify and respond to at-risk behavior.	<ul style="list-style-type: none"> <li>Create the learner equivalents of customer relationship management functionality, supported by predictive analytics; and</li> <li>Extend dynamic, predictive analytics to learner relationship management.</li> </ul>
<b>5. Create personalized learning environments/ learning analytics</b>	Embed personalized learning analytics into learning management systems and learner relationship management systems.	<ul style="list-style-type: none"> <li>Create personalized learning modes with embedded predictive performance analytics;</li> <li>Use these analytics-rich systems to personalize learning outcomes; and</li> <li>Create learning experiences reaching beyond formal curricula.</li> </ul>
<b>6. Engage in large-scale data mining</b>	Use data mining to illuminate pathways to student success and discover unforeseen insights.	<ul style="list-style-type: none"> <li>Leverage data mining to drive predictive modelling in processes;</li> <li>Use forensic data mining to explore unthought-of correlates of success; and</li> <li>Engage in cross-institutional comparison and cross-sectoral comparison.</li> </ul>
<b>7. Extend student success to include learning, workforce, and life success</b>	Expand the definition of student success to include the entire student lifecycle—cradle to career, including learning, work, learning-to-work transitions, and workforce success.	<ul style="list-style-type: none"> <li>Extend into Alumni analytics;</li> <li>Undertake data mining spanning institutions, industries, and sectors; and</li> <li>Pioneer pathway-to-success analysis.</li> </ul>

Source: Donald Norris, Linda Baer, et al., *A Toolkit for Building Organizational Capacity for Analytics* (Strategic Initiatives, 2012), p. 34. Reprinted with permission.

have genuine conversations with their advisors. This advising system provides students with a clean, clear snapshot of their current degree plan; allows advisors and students to get a quick comparison of different degrees; and enables students and advisors to focus their efforts on elevating the advising conversation. ACC found that students who used Degree Map two or more times to plan their courses experienced a 3.3 percentage point increase in persistence over students who did not use Degree Map—rising up to a 7.3 percentage point increase when used five or more times.<sup>20</sup>

Today, the iPASS market includes over 100 vendors offering solutions that include components such as degree audit and planning, analytics and reporting, and alerts.<sup>21</sup> The strongest iPASS programs combine these tools to best support students, advisors, and faculty members. Working together with the Community College Research Center, and in partnership with technology providers and colleges/universities, the foundation supports the development of technologies that improve student retention through iPASS, recently helping to provide grant awards to twenty-four institutions that are transforming advising in higher education.<sup>22</sup>

### Essentials for Successful Implementation

The successful implementation of personalized learning usually comes with a strategic shift at higher education institutions—from leaders to those working directly with students. As a result, the institution focuses on allocating resources and implementing business practices in a way that ensures each student's success. This requires that institutions and their leaders build core capabilities in student analytics and change management.

What underpins personalized learning and advising environments, however, is the use of learner analytics to drive institutional improvement around individual student success. This requires moving from the static data traditionally used for accountability purposes to gathering and

using real-time learning and advising data, which can inform decision making for administrators, student supports, and students themselves. This type of data allows important stakeholders to make informed, action-oriented decisions and allocate resources for student success.

faculty, advisors, and other staff to learn to use new technologies and analytics. To be successful, institutions must move forward with administering business practices that better support student success (despite existing environmental constraints) and with fostering

students. However, it had experienced challenges in getting faculty to use the new tools and the network in a proactive way. One of QCC's ongoing challenges in change management will be enabling students to benefit earlier from the support network.



Swift and meaningful changes must be made to the outdated design of the postsecondary system in order to create the flexible and personalized learning environment needed by today's student majority.

The Norris/Baer Framework (see figure 3, p. 18) highlights the interdependence of different dimensions of the college/university when planning to use data for student success. For many institutions, transformation starts with engaging students, then collecting and using predictive data to inform retention, create learning environments, and support students moving into the workforce. Norris and Baer also offer a diagnostics review that institutions can use to determine how they should develop their analytics capabilities.

### Change Management and Continuous Improvement

Personalized learning interventions cannot be effectively utilized and deployed without the connective tissue of organizational strategy and change management. This means aligning organizational processes such as strategic planning and capacity building. It also requires providing appropriate time, development, and supports for leaders,

a culture of continuous improvement using the newly available tools.

An example is Queensborough Community College (QCC), which used Starfish Early Alert and Connect modules to create a network of student support services across the campus, including the Academic Literacy Center, the Campus Writing Center, the College Discovery Center, the Math Learning Center, and the Student Learning Center.<sup>23</sup> This Student Support Network gathers real-time feedback from faculty and students to guide students to the resources that are most pertinent to their needs at the right time. This has allowed a breakdown of silos between support services, as well as between faculty and students. The redesign also provided a structure that can respond intentionally to student needs with the right intervention resources available on campus. For example, QCC found that academic tutoring was one of the more promising interventions when delivered appropriately to at-risk

### The Time Is Now

With more than 40 percent of first-time, full-time bachelor's degree-seeking students at four-year postsecondary institutions dropping out before finishing a certificate or degree within six years, we can't afford to stand by and do nothing.<sup>24</sup> Swift and meaningful changes must be made to the outdated design of the postsecondary system in order to create the flexible and personalized learning environment needed by today's student majority.

Benjamin Franklin is said to have observed: "Tell me and I forget; teach me and I remember; involve me and I learn." Personalized learning involves students in their own growth and encourages them to take ownership of their learning. The structured, individualized, and supported approach helps them see a clear and guided pathway to academic and career success.

Bringing personalized learning solutions to the broader U.S. higher

education system will require major system changes and buy-in from colleges and universities around the nation. We have no time to waste in unlocking student success. Students deserve the environment and supports that will help them reach their full potential and earn their higher education certificate or degree. ■

#### Notes

Yvonne Belanger, Julia Gray, Jason Palmer, and Tracy Sherman also contributed to this article.

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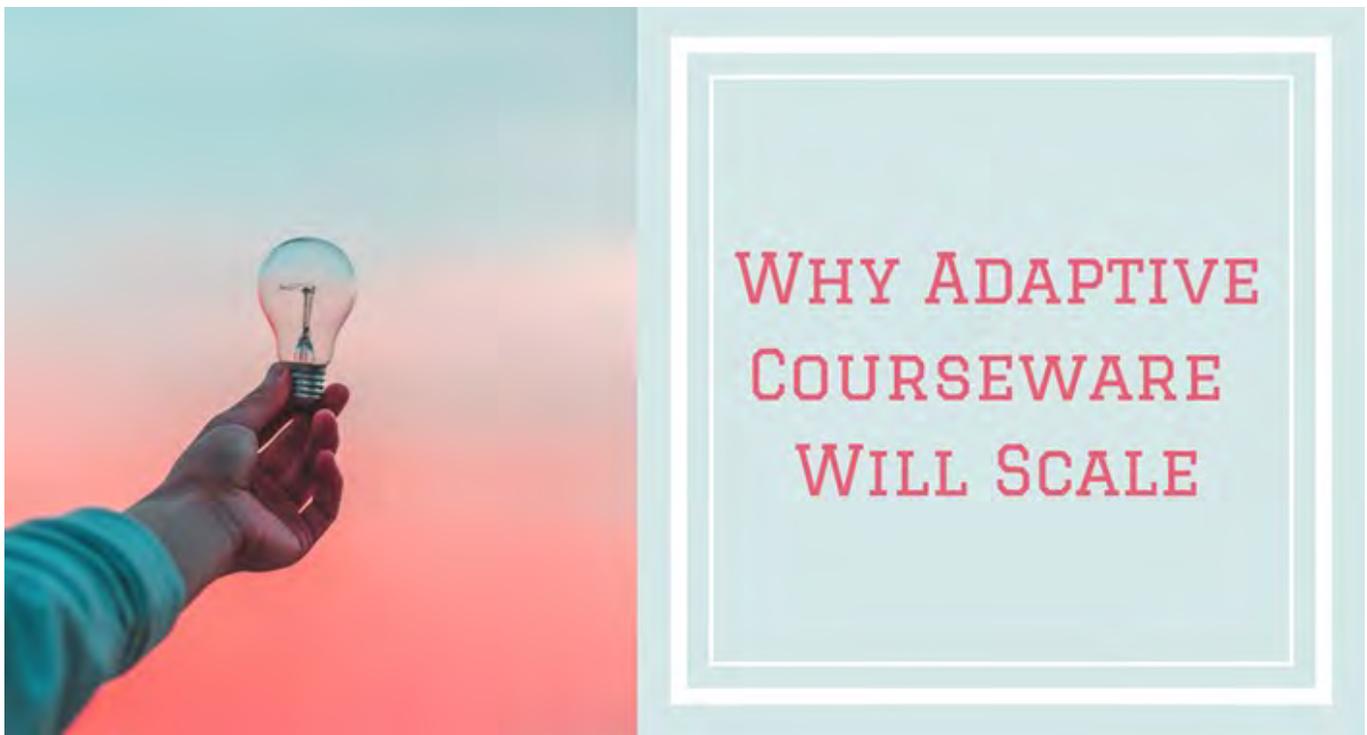
Photo by Brandon Hill

# Why Adaptive Courseware Will Scale in Higher Ed

by Karen Vignare

Monday, September 18, 2017

Transforming Higher Ed



Universities are making huge technology and personnel investments in order to improve student success. Only a few of those efforts, however, invest in faculty development and support. Yet faculty are key to student success.

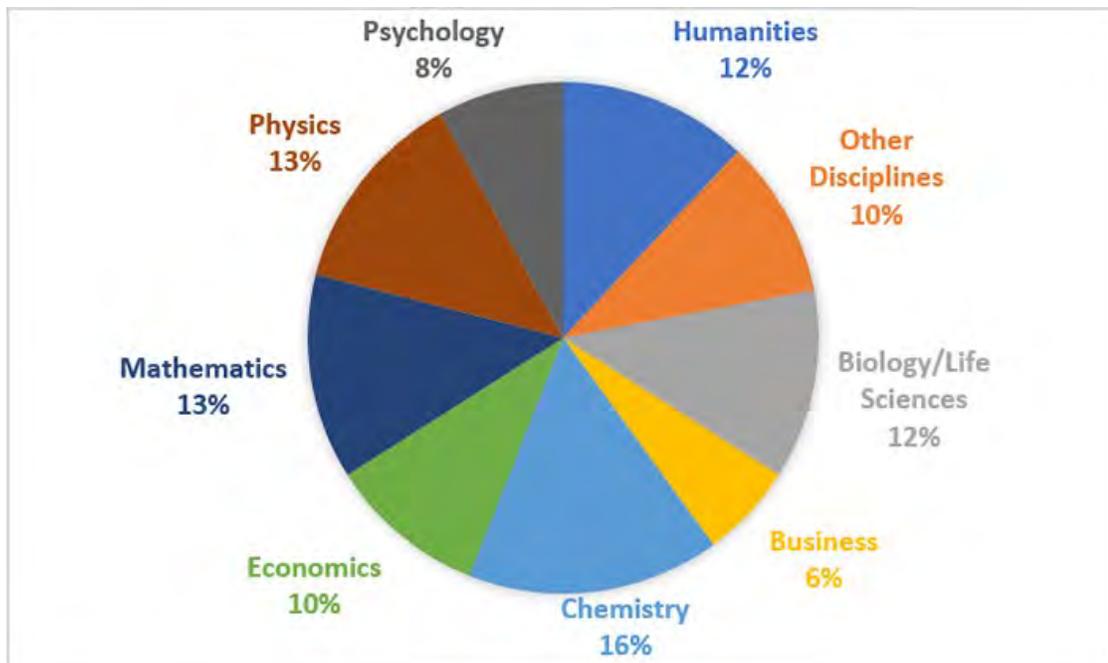
Currently, faculty members lack sufficient learning analytics about where students are struggling — especially early on in the semester. Adaptive courseware is a technology that can provide academics with valuable information regarding who needs help, and in what areas. It can also allow faculty to reshape valuable classroom time so that the focus is instead on active learning designed to help students clear misconceptions and build content comprehension.

The Association of Public and Land-grant Universities (APLU) grant program *Accelerating Adoption of Adaptive Courseware at Public Research Universities* includes eight participating institutions:

- Arizona State University
- Colorado State University
- Georgia State University
- Northern Arizona University
- Oregon State University
- Portland State University
- University of Louisville
- University of Mississippi

## Adaptive Courseware Adoption Is Increasing Across Disciplines

In the first six months of the grant, the universities collectively reported over 22,000 enrollments. In that same six months, program managers increased the number of vendors from six to 12 which means that universities now have more choice among adaptive courseware tools. As the chart below shows, the disciplines where courseware is being used are spread across most introductory general education courses.



Universities involved in the scaling grant will tell you this is hard work. Many of the adaptive courseware products are still being developed and improved. Faculty and departments want data about whether these products will work (or not). But those same faculty, departments, and program managers also agree current student success rates are simply not good enough. For students who are low-income, minority and first generation, the student success rates are even more problematic.

Each university has its own individual context that lays the groundwork for scaling adaptive courseware, but all of them recognize that without discipline and course faculty working together, reaching a broader scale is not possible. Each university program manager is identifying lead faculty but also working simultaneously with departments — and often entire colleges — thus securing bottom up and middle management alignment.

## Faculty Insights + Technology Lead to Successful Changes, Intervention

Of course, that is only a first step. Then comes the challenging work of reviewing vendor courseware. There are some helpful tools like the **CWiC Framework** which require vendors to address whether products meet certain standards like adaptivity. Faculty often need to scrutinize carefully the content, assessment, and outcomes to make sure those items align with published syllabi. In some cases, content and syllabi need to be redesigned to create a better course experience leveraging the adaptive courseware.

Faculty and program managers then turn their attention to the learning analytics. These vendor systems provide significant data on students, but for the most part, it is up to faculty to interpret and intervene. The real-time data enables faculty to reach out to individual students and change activities in the classroom.

Most of our universities indicate that by and large, faculty are coupling adaptive courseware with active classroom learning, and where possible using new active classrooms or at least redesigning the remaining classroom time to be active. Classroom time is now spent clarifying students' understanding of the material versus just engaging in lecture. In fact, APLU was able to bring together about 100 faculty and staff this past summer at the University of Louisville to attend the Faculty Workshop on Active & Adaptive Learning. Our workshop facilitator, Dr. Scott Freeman, has published multiple research pieces on how active learning benefits students at risk. That meeting has led to six new online communities of practice sharing effective practices and failures to avoid when launching and scaling adaptive courseware in your discipline.

The APLU grant has spurred an interest in adaptive courseware. Combined with faculty desire to improve teaching, and universities desire to increase student success, these tools will lay the foundation for scaling.

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MARCH 18TH, 2017

# Making Faculty Development an Institutional Value and a Professional Practice

By: Henry W. Smorynski, PhD

Sometimes faculty development programs are inherited by an academic leader, and other times they have to be built. In either case the academic leader needs to heed some wisdom from the Chinese classic the *Tao Te Ching*. Development of faculty is a long journey wherever one starts; like a journey of 1,000 miles, it begins with the first step. Faculty development is also to be understood as a destination. Only if one has a clearly identified end for it will it achieve its desired destination—a highly effective and participatory faculty.



Faculty development program success begins with recruiting faculty to a specific institution's mission during the recruitment and interview process. Bringing faculty into an institution who are not committed to its teaching, research, and service mission incentives and imperatives will lead to mismatches between faculty career aspirations and institutional resource commitments. Such mismatches undermine collegiality and undercut faculty development efforts. Hiring faculty who are overly focused on their discipline versus teaching and the school's mission will lead to faculty dissatisfaction and turnover, with negative consequences for the classroom and within academic departments.

Beyond successful hiring, faculty programs will founder if they do not have a strong advocate at the highest level of academic administration. If the academic leader does not acquire and distribute resources consistent with the mission of the institution, wrong messages are sent. Faculty can become committed to one specific type of educational innovation. They can seek release time for their own career interests rather than the mutual interests of the institution and the faculty member. And they will come to view faculty development more as a competition for resources or an activity undervalued by the institution. Only strong academic administration leadership can provide the direction and energy necessary for a high-quality faculty development program. No faculty development director or coordinator, or even a faculty development resource office, can make up for the lack of a clear, constant, and resource-committed academic leader who visibly promotes and rewards effectively institutional mission-inspired faculty development.

A third key ingredient in faculty development success is choosing the right point person to be the daily spokesperson. Improper selection of the faculty development coordinator or director can sink any program. One needs to avoid the error of choosing the most innovative faculty member in the college or university. One should also not choose a faculty member well known for a particular kind of teaching, like case studies or computer simulations. The selection of the faculty development director or coordinator should be driven both by his or her commitment to all kinds of development and experimentation in teaching and research and by widespread colleague acceptance and confidence. Only a few faculty in any institution will meet both these criteria. Without both characteristics being present in the faculty development coordinator or director, the overall faculty development program and faculty participation in it will be limited to only highly motivated faculty or select faculty departments. It will never gain large-scale participation rates (over 75 percent). It will not reflect the necessary vitality to change and innovate as theories, methods, and research in higher education change regarding best practices.

A fourth element of a successful faculty development program involves the creation of a common basis for development efforts shared by the faculty as a whole. Although not widely accepted or understood by faculties in general, the work of L. Dee Fink can be very beneficial in creating that basis. His concepts articulated in *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses* can provide a common basis for faculty across all disciplines. By creating courses through a learner-centered approach versus a subject-oriented approach, one opens up the faculty to innovation, experimentation, and good teaching practice sharing, which are all vital to a healthy faculty development program. His model of an integrated course design brings together four key elements—learning situational factors, learning goals, teaching and learning activities, and feedback and assessment—into a powerful combination through the idea of “backward course design.” This means the syllabus and course are designed from student learning objectives and not subject matter coverage.

If one has built these four elements into a faculty development program, then one needs to complement them with an anchoring and reinforcing faculty performance evaluation system. Tenure, promotion, and merit pay, where applicable, must identify faculty development as a key measurement for the evaluation and rewarding of faculty. A lack of consistency between academic leader messaging and promotion and tenure criteria used in any institution will doom any faculty development program to be engaged in primarily by true believers or innovative academic departments. It will not impact more than 25-40 percent of the teaching faculty, in my experience of promoting faculty development at nine different higher education institutions over 20 years. It will have very limited positive impact on teaching in the classroom, student retention, and institutional attractiveness and reputation.

Parker Palmer’s book *Courage to Teach* should be required reading along with Fink’s integrated course design. Palmer addresses clearly and convincingly the importance of individual faculty integrity to the teaching-learning process as being rooted in the integration of subject matter, student characteristics, and the faculty member’s core identity as an educator. All three of these aspects must be visible and practiced in a widely appealing and engaging faculty development program.

Faculty development must be viewed as a diffusion process. If the fundamentals for success are put into place and practiced consistently, then the faculty development program will be successful both in terms of institutional impact and faculty career satisfaction. Building that diffusion effort systematically requires certain identified practices. These practices include a program that covers annually the wide-ranging interests of faculty that include teaching best practices, research time releases, team-teaching opportunities, faculty seminars and luncheons to share experiences led by colleagues, and annual visits by outside leaders in innovation in

higher education. Program mix is a crucial sustaining element of successful faculty development programs.

Diffusion also depends on the annual or semiannual required faculty development days tied to an institution's mission. These days highlight current faculty creativity and innovation across all disciplines in the institution. They are an important time of bonding the institutional commitment to faculty development.

Finally, an effective and successful faculty development program depends on each individual department promoting disciplinary and teaching innovations relevant to their courses, students, and disciplines to reinforce the overall institutional program.

Faculty development programs can easily achieve 25-40 percent faculty involvement and participation. But only programs that are structured from recruitment to post-tenure review will deliver a comprehensive institutional mission benefit for all faculty and the students they serve.

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# Research on Active Learning Classrooms

## Scenario

Corbett College has begun converting some classrooms to support active learning. Informed by the institution's own research and a growing body of literature in the field, Corbett sought to create an incubator space that encourages experimentation in pedagogy by faculty from various disciplines. The college's initial effort was to repurpose a computer lab that had fixed tables, a bank of computer towers, and a single AV projector, all focused on an instructor's podium. To make the space more conducive to active learning, staff at Corbett got rid of the tables and computers and installed modular furniture, half a dozen large displays with seating for teams of six students, and whiteboards on every wall. With wired and wireless connectivity, the room's technology is predicated on students and faculty bringing their own devices. The podium is gone, too—instructors and students alike can present from anywhere in the room.

To measure the results of experimentation in the new space, Corbett's instructional designers collaborated with staff from the center for teaching and learning to create assessments, including focus groups with faculty and students. One key lesson has been that no matter how flexible and feature-filled an active learning class might be, making the space work for instructors depends on robust course design and the availability of technical support. A support plan to help instructors use the space proved invaluable in encouraging faculty to use the classroom and experiment with active learning pedagogy. Corbett found that adjustable lighting helped define zones for different kinds of learning tasks and that these classrooms work best when the acoustics are designed to mitigate the sound of conversations among students engaged in collaborative learning. A somewhat counterintuitive finding for such a technology-rich space was that low-tech equipment like round tables and whiteboards can foster group work more than the high-tech provisions.

Reflecting on lessons from this experiment, officials at Corbett recognize that the active learning classroom is starting to spark course redesign and more use of active learning pedagogy—to the extent that demand for active learning classrooms now outstrips supply. Institutional planners have asked for additional funding to meet that demand. They are also sharing what they have learned by developing a paper on effective design for active learning classrooms.

## 1 What is it?

A regularly cited [definition](#) suggests that active learning consists of “instructional activities involving students in doing things and thinking about what they are doing.” Research into active learning classrooms (ALCs)—spaces explicitly designed to support and promote this kind of learning and pedagogy—is expanding. This research provides educators with **insights about how best to implement active learning pedagogies and support learners in ALCs**. In addition to raising important questions, the research gives institutions a growing body of evidence on which to base critical decisions about investing time, money, space, and human resources in the development of these classrooms.

## 2 How does it work?

ALCs are designed to help students work together and to enable faculty to move freely around the room as guides for learning rather than as lecturers. The spaces often have furniture that can be easily reconfigured to accommodate team projects, group problem sets, structured discussions and debates, experiments with manipulables, and various forms of collective presentation. ALCs typically have robust AV/IT capacity, including screen displays linked to one another and to the campus network and the Internet. Studying how pedagogy and physical space can influence each other, **researchers assess how well design elements work and how they affect learning**. A typical study might explore the effects of ALCs on student perceptions and academic performance. Similarly, other studies investigate how faculty members who teach in these classrooms believe the experience changes their pedagogy and effectiveness in nurturing learning. Another branch of the research looks at the physical architecture of classrooms, studying different models for such spaces and, often, comparing them to traditional classrooms. These latter studies often include appraisals of the relative costs of ALCs compared to more traditional classrooms.

## 3 Who's doing it?

One of the most comprehensive recent studies of active learning classrooms is the book [A Guide to Teaching in Active Learning Classrooms: History, Research, and Practice](#). After canvassing foundational research conducted at North Carolina State University, MIT, and the University of Minnesota, **the book reviews**

# Research on Active Learning Classrooms

**the growing literature related to ALCs, essentially setting an agenda for further theoretical and empirical research on their impact.**

Several important recent studies, including [research](#) from the City University of Hong Kong and, separately, from researchers at [multiple universities](#), explore the effects of ALCs on student learning. McGill University maintains a [web page](#) that synthesizes information about teaching and learning experiences in ALCs, as does a [landing page](#) at Curtin University. An initiative based at North Carolina State University, [SCALE-UP \(Student-Centered Active Learning Environment for Undergraduate Programs\)](#), has inspired active learning development at scores of universities. Oregon State University has initiated a research program studying learner experiences in multiple space types in its new Learning Innovation Center building, several of which are significant experiments to enhance teaching at scale with active pedagogy. The Educational Technology Services group at the University of California at Berkeley published [results](#) of a “test kitchen” developed to assess active learning. Researchers at the University of Washington have published [findings](#) that active learning increases student performance in science, engineering, and mathematics.

## 4 Why is it significant?

Teaching practices in higher education have been changing rapidly to include active learning pedagogies that research shows to be effective. Fundamentally, **higher education needs to know why active learning works, how it works best, and how these methods can be adopted more widely.** We need to know more about the impact of ALCs on pedagogy, learning, and student success and retention—whether, for example, students in ALCs learn differently or better or faster than their peers in more traditional classrooms and what pedagogical practices best support active learning. Similarly, we need to understand what environments and features best support active learning. Research on ALCs contributes to deeper inquiries, as well, including adding to the understanding of how people learn. Research on ALCs provides essential data to help institutions make critical financial decisions about space allocation and design, especially given that active learning spaces require more area per seat.

## 5 What are the downsides?

**Isolating the effects of room design on teaching and learning can be exceptionally challenging.** Researchers often rely on proxies to measure learning. Many active learning classes enroll

too few students for research purposes, and obtaining controlled comparative data can be difficult. Cooperation from faculty may also prove elusive—they might be skeptical about active learning itself, just getting used to it, or concerned that the process of conducting the research will be intrusive in their classrooms. Students and faculty may have preconceptions of what teaching and learning mean (e.g., that “teachers talk and students listen”) and may have minimal experience with the different types of interactions that ALCs support. This kind of research can be expensive—e.g., when it engages multiple control groups or is conducted over long periods of time—and funding for such work may be hard to find.

## 6 Where is it going?

Going forward, research on ALCs is likely to include larger studies and those that investigate the effects of ALCs over longer periods of time. Analysis of the **extensive data available through learning analytics will help evaluate the effectiveness of learning experiences in these spaces.** Given that much of the research to date has focused on the effects of active learning on courses within a relatively narrow range of disciplines, particularly STEM, future research could include a wider range of fields, particularly in the humanities. Further, future research will likely dive deeper into particular dimensions of active learning and ALCs—as, indeed, is suggested by emerging research on classroom acoustics, temperature, and lighting. As more evidence of usage becomes available, more sophisticated analyses will emerge around the cost-effectiveness of ALCs.

## 7 What are the implications for teaching and learning?

Research that shows the efficacy of ALCs—or, alternatively, that sheds light on how to avoid some of their pitfalls—helps advance the use of such spaces and **informs improvements in the design of learning spaces.** Findings about how space design can encourage more effective learning will challenge faculty members and faculty development experts to adopt active learning pedagogy and help learners engage with and learn from one another, contributing to student success. More broadly, the research findings can also influence curriculum development and instructional design. In those respects, the research challenges higher education to adopt new thinking and can help change longstanding paradigms of pedagogy, learning, and classroom design.



# ACAODigital Fellows Program

## Additional Resources and References

### Curated Assessments of Digital Resources

**The Merlot Project** ([merlog.org](http://merlog.org)), hosted by the California State University System, provides access to curated online learning and support materials and content creation tools, led by an international community of educators, learners and researchers.

### Implementation Guides

**[A Guide for Implementing Adaptive Courseware: From Planning to Scaling.](#)**

Association of Public and Land Grant Institutions, October, 2018.

Drawing on the approaches to transformative change at eight campuses, this guide is designed to help other institutions improve and accelerate their implementations of adaptive technologies in gateway courses.



**[CWIC Guide to Courseware Adoption.](#)**

OnLine Learning Consortium and Tyton Partners.

This guide provides an overview of the different stages of courseware adoption, from determining readiness to scaling a courseware solution.



**[Courseware in Context.](#)**

OnLine Learning Consortium and Tyton Partners, August 2018.

This guide provides an overview of the different stages of courseware adoption, from determining readiness to scaling a courseware solution.



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