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What is the role of provosts/ CAOs in campus efforts to bring digital resources into gateway courses?

What do provosts/CAOs learn when they are involved in new initiatives to do so?

by **Kenneth C. Green** and **Rebecca Hatkoff**

Who has most often led the campus efforts to advance and support technology-enhanced pedagogy and instructional innovation: the chief academic officer (CAO, often referred to as the provost) or the chief information officer (CIO)?

Beginning with the arrival of IBM PCs and Macs on campuses in the early/mid-1980s, much (perhaps most) of the campus discussion about the institutional leadership for technology and digital pedagogy has focused on (or involved) CIOs. The integration of information technology into the curricular experience of undergraduates has often been viewed primarily as a technology challenge rather than a pedagogical issue. Consequently, the (perceived) pressing instructional IT challenges typically focused on 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 have often led because many CAOs (like many professors) deferred to the technical experience and expertise of their CIOs and tech-savvy faculty advocates and evangelists. Too, save for the small number of institutions that launched student notebook initiatives (perhaps several dozen, at best), the pedagogical issues were more often about departmental preferences than about institutional priorities and strategies.

CAOs are academic officers. In contrast, in most academic enterprises, CIO responsibilities are operational, not academic and (generally) not programmatic. In other words, CIOs typically *are not* responsible for academic programs and related academic initiatives. Nonetheless, at many institutions, CIOs frequently lead on digital pedagogy. Moreover, the actual (or inferred) leadership role of CIOs for various "technology-touched" instructional initiatives has extended into online education at many campuses. For example, data from the 2016 Campus Computing Survey reveals that at nearly one-fifth (19 percent) of the institutions participating in the annual survey, online/distance education programs reported to CIOs. The 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.[1] Clearly at many campuses, IT officers emerged as the institutional leaders (or catalysts or sponsors) of technology-driven instructional innovation.

And yet as noted above, academic programs and related operations—teaching, learning, and scholarship—traditionally are the domain of the provost/CAO. Indeed, scholars of higher education and

[1] Kenneth C. Green, ***Campus Computing 2016: The 27th National Survey of Computing and Information Technology in American Higher Education*** (Encino, CA: Campus Computing Project, December 2016).

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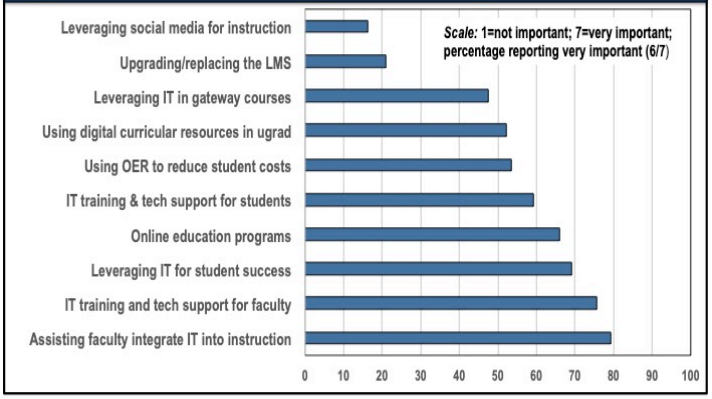
campus culture view CAO engagement and leadership as essential for any major changes in academic strategy, institutional mission, or other related initiatives. As noted in a 2015 *Chronicle of Higher Education* article "The Path to Change Runs Through the Provost's Office": "If a campus is going to pursue 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."[2]

To explore the CAO role in digital leadership and pedagogy, we draw on two sources: (1) a fall 2017 national survey of CAOs, on the topic of digital pedagogy, and (2) the interim (year one) reports from the 31 CAOs selected as Association of Chief Academic Officers (ACAO) Digital Fellows (see sidebar), regarding the gateway course initiatives at their institutions and the challenges and benefits of "going digital."

The ACAO Fall 2017 Survey of CAOs

As part of the Digital Fellows Project, ACAO launched a national survey of CAOs. The survey focused on digital pedagogy and 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, nonprofit colleges and universities that enrolled more than 1,000 students; 359 provosts/CAOs participated in the survey.[3]

Figure 1 CAO Perspectives on Campus IT Priorities

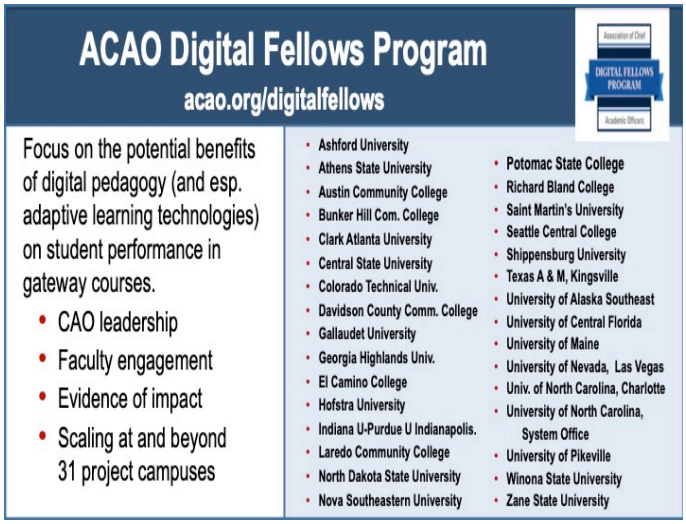


The survey data reveals that CAOs' top IT priorities clearly focus on instruction, tech training and support for faculty, and leveraging information technology for student success (see figure 1). Interestingly, the CAO focus on instruction seems more generalized (or generic) than targeted: almost fourth-fifths (79%) 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%) said a top IT priority was "using digital curricular resources in undergraduate courses" and just under half (47%) identified "leveraging information technology in gateway courses" as a priority. The gap (about 25–30 percentage points) between general support and more specific implementation strategies may reflect less direct knowledge by CAOs about digital pedagogical strategies, options, and interventions.

The 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 (see figure 2). CAOs overwhelmingly affirm that "digital curricular resources make learning more efficient and

ABOUT THE ACAO DIGITAL FELLOWS PROJECT

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). The intent of the project was to foster and support the appropriate use of digital pedagogical resources in gateway courses. Central to this initiative was 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 occurred as part of larger institutional efforts focused on student success (e.g., enhanced student learning and improved retention and graduation rates), particularly among low-income, first-generation, and minority students.



With generous support from the Bill & Melinda Gates Foundation, the ACAO Digital Fellows Project launched in January 2017. Following a national competition in spring 2017, 31 ACAO Digital Fellows were selected in June 2017. The project hosted workshops in the summer and fall of 2017. In the winter of 2018, the Digital Fellows launched campus pilot projects at their institutions.

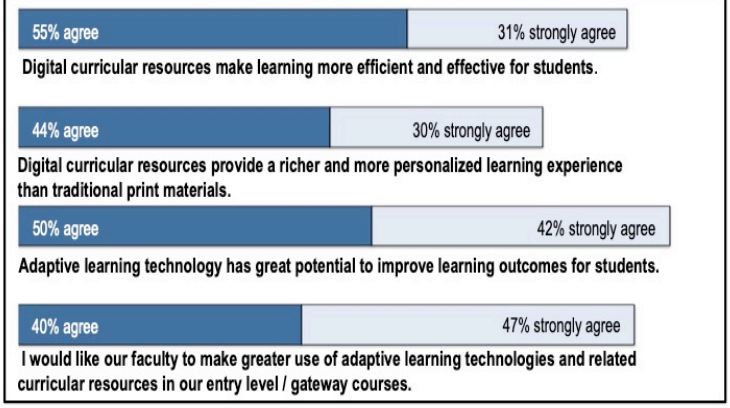
It is now appropriate to ask (1) what do we know about CAOs and digital pedagogy, and (2) what have the 31 ACAO Digital Fellows learned about the challenges of deploying digital pedagogical resources to improve student learning and student success in gateway courses? The full report on the impact of the Digital Fellows initiative—at the participating institutions and beyond—will be available in fall 2019.

[2] Lee Gardner, **"The Path to Change Runs Through the Provost's Office,"** *Chronicle of Higher Education,* September 8, 2015.

[3] Private, nonprofit two-year colleges were not included in the survey population. For the full survey results, see Kenneth C. Green, ***Provosts, Pedagogy, and Digital Learning: The 2017 ACAO Survey of Provosts and Chief Academic Officers*** (November 2017).

effective for students" (86% agree or strongly agree) and that "adaptive learning technology has great potential to improve learning outcomes for students" (92% agree or strongly agree). Almost 90 percent would like to see their faculty make greater use of adaptive learning technologies in entry level and gateway courses.

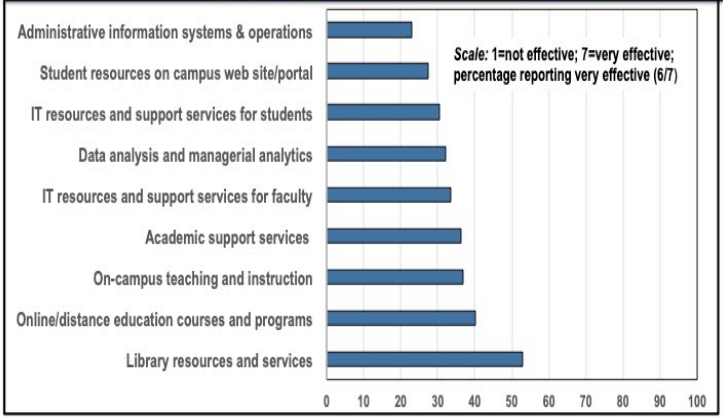
Figure 2 CAOs are Optimistic About the Potential Benefits of Digital Resources in Instruction



However, when asked to assess the effectiveness of current campus investments in IT resources and the general campus satisfaction with key IT applications and services, CAOs are far less effusive (see figure 3). The highest-rated resources and services are the campus investments in library systems, online education, on-campus teaching, academic support services, and faculty support services. In contrast are the four investments that get the lowest "effectiveness" ratings from CAOs: administrative information systems, student resources on the campus website/portal, IT resources and support services for students, and data analytics. Admittedly, the gap is not large between these four and the higher-rated items, and the survey means and medians on these higher- and lower-rated items may be close. Too, the disbursement (rankings 1–7) may suggest that many CAOs view 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 the data in a broader context. 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 data presented above and in the full 2017 ACAO survey suggests 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 information technology for instruction and operations and also the current level of satisfaction with key IT resources and services.

Figure 3 CAO Assessments of the Effectiveness of Campus IT Investments



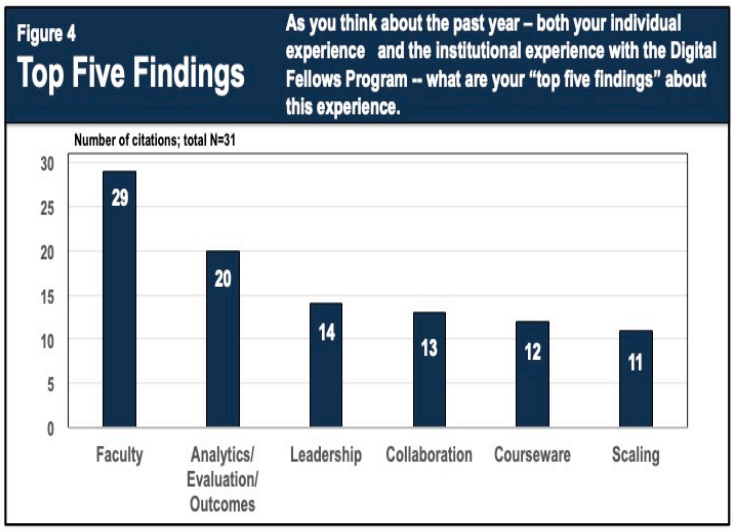
CAOs on the "Going Digital" Experience

As part of ongoing project evaluation activities of the Digital Fellows Project, in spring 2018, the 31 ACAO Digital Fellows were asked to report on what they had learned "one year in" about the opportunities, challenges, and potential benefits of deploying digital pedagogical resources to improve student learning, student retention, and student success in gateway courses and also to share their insights regarding how to engage faculty and scale digital initiatives. Specifically, the CAOs were asked to think about their individual and institutional experiences and to identify their top five findings about the "going digital" initiatives and experience at their institutions, along with the overall Digital Fellows experience (see figure 4). Perhaps not surprisingly, many of the issues the fellows cited align with the priorities that CAOs had identified in the fall 2017 ACAO survey.

The summary data from the open-response questions reveals that the leading finding 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 (29 of 31). Analytics/evaluation/outcomes emerged as a distant second, followed by a near tie for third among leadership, collaboration, courseware, and scaling.

The Focus on Faculty

For a project intended to promote the use of digital pedagogies, the CAO focus on faculty, rather than on courseware, might seem surprising. Following the arrival of the first IBM PCs and Apple Macs on college campuses in the mid-1980s and the continuing campus quest to integrate technology into instruction, much of the planning and policy conversation about "going digital" and making greater (or better) use of IT resources in the postsecondary curriculum has focused on the technology



resources and tools. Yet the CAOs' comments 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 CAOs' statements 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 want 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 adapting the course for different rates of student mastery."
- "There is a significant 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, and administrative involvement and when the penalty for failure is removed."
- "Do not shortchange 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 training 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 Teaching, Learning, and Technology Centers. They 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 with 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 the 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.

The CAOs' comments 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 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. Like their comments

about faculty issues, the CAOs' statements regarding analytics, evaluation, and outcomes 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 [institutional research] 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. For example, although the research literature on adaptive applications, in particular, is growing, adaptive technologies are still, in many ways, early (and often immature) technologies. It is thus no surprise 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 since so much of the technology (and some of the research literature) comes from commercial providers rather than campus colleagues, faculty researchers, and/or 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 documents 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 a faculty colleague 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 a resource that can inform and foster best (or better) practices. And based on the comments above, CAOs acknowledge that compelling narratives drawing on data, credible research, and (often) the experience of peers are needed as necessary catalysts for change.

Leadership

James G. Ptaszynski, formerly a senior fellow at the Bill & Melinda Gates Foundation (and now the vice president for digital learning for the University of North Carolina System), reports that the 2015 article "The Path to Change Runs Thorough the Provost's Office" (noted above) was one of several catalysts for the development of the ACAO Digital Fellows Project. Given the Gates Foundation's interest and investment in the effective deployment of digital pedagogies to improve student learning and student success, this is not surprising. Whereas the Gates Foundation's other postsecondary digital initiatives have often had a more programmatic orientation, the Digital Fellows Project was designed to explore and support the role and impact of campus leaders—that is, provosts and chief academic officers—in advancing the appropriate use of digital pedagogies in gateway courses.

What, then, did the CAOs learn during 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:

- "Digital pedagogy projects that span multiple disciplines will require significant leadership from deans and the provost in order to succeed."
- "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 takeaway 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 eager 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 not only for them to support 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 it 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

not buy into the intended goal. It should not be presented as a top-down initiative. Allow faculty to own the project; thus, as part of their 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 Digital Fellows Project into a larger, campus-wide movement yields higher buy-in. Our Digital Innovation Movement 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 ACAO Digital Fellows following the launch of their campus projects in the winter of 2018, plus the comments in their Year One reports, make it clear that they have not only a new understanding about the power and potential of digital pedagogical resources in gateway courses but also a firm resolve to "stay the course" to advance the appropriate use of these digital pedagogical resources. As noted above, successful "going digital" initiatives require both "significant leadership" from the provost and deans and a long-term commitment.

Collaboration

The CAOs' comments reveal two levels of critical collaboration. First, and most obvious, was the importance of collaboration among faculty, deans, instructional support staff, and campus leaders:

- "Working with faculty and providing them with opportunities to work together are key to success."
- "It takes a village of support to ensure the success of adoption."
- "Collaboration across and within departments led to successful planning and training."
- "Collaboration from various sectors is necessary. One should not think of a new initiative as 'my project'; rather, the intentions of others and the assistance of other supporting units can be the deal breaker for effecting change."
- "Collaboration is one key both to deploying new systems and to inspiring faculty buy-in to technology; bring faculty into the discussion of pedagogy, curriculum, and metrics as well as the reasoning behind adding technology early, ask for opinions and suggestions, and keep channels of communication open."
- "Vertically and horizontally integrating innovative efforts across the curriculum is hard. Efforts done in isolation are likely to fail to thrive, but efforts done communally have a higher likelihood of success. This takes much more time and cooperation but pays off."
- "Incorporating the [Digital Fellows] Project into a larger campus-wide movement yields higher buy-in. 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."
- "Create a project working group consisting of unit leaders with the needed resources and individuals with appropriate expertise who have been given the mandate, authority, and time to dedicate to the initiative."

These comments affirm the critical importance of collaboration across campus units and job titles. But the CAOs' comments also revealed a second—and equally critical—aspect of collaboration: the rare and unique opportunity for senior campus officials to work with peers from other institutions in a structured and collaborative learning experience.

- "Working with and learning from people, resources, and other institutions across the nation has created a clearer sense of the national landscape of digital learning.
- "Collaboration across institutions has been critical. I found a terrific support group in the other provosts. The quarterly meetings gave me a chance to share notes and to seek advice and support."
- "Ultimately, the collective learning within a network of colleagues that support our shared efforts has provided benefits that will extend far beyond this program."

The comments about the ongoing collegial collaboration among the 31 Digital Fellows stand in stark contrast to what many campus leaders often experience: the isolation of the CAO's office, especially in the context of

new academic initiatives led (or strongly supported) by the provost/CAO.

Courseware

For many Digital Fellows, 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, but also some 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 the potential of the emerging digital platforms and resources implicitly require a larger effort at course redesign, rather than minor or supplemental "retooling."

Many of the Digital Fellows' campuses experienced anywhere from modest to significant success with their pilot projects as measured by course retention, reduced DFWI rates, and other metrics. Yet in conversation and in comments, the CAOs expressed clear concerns (often echoing their faculty) about impact, productivity, costs, and accessibility:

- "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 was 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."
- "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 Volunteer Product Accessibility Templates (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."

Some CAOs noted:

- "Faculty prefer ready-to-go digital tools over full course redesigns."
- "It's great to use tested and proven courseware; it's not always necessary to forge a new path."

And several Digital Fellows cited the importance of collaboration with other institutions:

- "Work with other institutions to keep the pressure on the vendors to enhance their applications (e.g., make it possible to create cohorts) in ways that support what the campuses need as they continue to utilize the application to effect change."

Scaling

Scaling pilot projects was an explicit requirement of the Digital Fellows Project. Participating CAOs and their institutions had to commit to move beyond a pilot in one or more courses to scale (expand) digital initiatives into other gateway courses. The caveat here, of course, was for thoughtful and appropriate efforts at scale, rather than simply "bolting on" more digital tools into other gateway courses.

Scaling involves several challenges. It's one thing to scale within multi-section courses in disciplines such as math or chemistry: if a pilot in a few sections is successful by various metrics (e.g., retention/reduced DFWI numbers, student performance on midterms and finals), then scaling might just involve expanding the pilot to cover all sections of the course. In contrast, scaling *across* courses and disciplines (e.g., asking what was learned from experience with digital resources in algebra that might apply in calculus or chemistry) can be more complex and challenging as it involves different curricula, digital resources, and faculty.

The Digital Fellows shared a range of experiences and perspectives about their plans for and efforts at scaling. Two CAOs clearly articulated the importance of acknowledging campus culture and context in scaling efforts:

- "The ability to implement ready-to-go digital tools as opposed to course redesigns would be most receptive to our faculty given their teaching and other duties."

- "Build and expand capacity upon what you already have. Use the traditions, platforms, and history of the institution to move forward a project or new idea. Never refer to this as replacing the old but rather improving what you already have for continuity and buying in and recruiting new allies."

Another cited the importance of synergies in the scaling effort:

- "Cultivate excitement about scaling by capitalizing on synergies. Though our target is on students taking algebra in advance of calculus, I've been in a position to cultivate some momentum/excitement through other work that I'm connected with."

And some CAOs, while reporting good outcomes from their pilot projects, also offered a cautious assessment about the inferred link between scaling and faculty (or instructional) productivity:

- "Although courseware does improve learning and student success, it does not increase productivity or reduce the cost/credit hour of instruction."
- "Most of the digital courseware my faculty and I identified did not scale to increase faculty productivity. That is, it 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."

Also consistent in the CAO comments and conversations about scaling was the importance of both data and peer-to-peer engagement among faculty: data that confirms a digital initiative did have some desired/positive outcome on the student learning experience, coupled with first-person faculty narratives about the experience and the impact.

Outcomes and Conclusions

The Digital Fellows Project resulted in 31 campus pilot projects encompassing 84 courses involving 103 faculty and some 7,500 students. The preliminary evaluation data suggests that many of these pilot projects saw gains in various traditional metrics for student learning and outcomes such as higher course-completion rates and lower DFWI numbers. But these metrics provide only a top-level overview of short-term impact and benefits.

A second set of metrics focuses on the financial return on investment. At many of the participating institutions, modest campus grants ($6,000) to support midyear pilot projects were a catalyst for significant additional investments of personnel and financial resources. A preliminary estimate 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 project campuses.

Scaling represents a third set of metrics. All 31 institutions participating in the Digital Fellows Project have clear plans to expand their digital pedagogy pilot projects to include more courses and additional departments. The success of the initial pilots has generated interest among other faculty and has led CAOs and department chairs to commit money and personnel to support course redesign and deploy various digital pedagogical applications. (We will have additional information about scaling activities and successes in the final Digital Fellows Project Report, which will be available in fall 2019.)

Beyond metrics, the Digital Fellows Project resulted in personal and professional gains for each of the 31 participants: (1) a broader, deeper, and more sophisticated understanding about the potential benefits and the potential challenges involved with digital pedagogical resources; (2) a new (or renewed) appreciation for and deeper understanding of the critical role of faculty in course and curricular redesign intended to foster student success; and (3) a new (or renewed) appreciation for the critical role of the provost/CAO in supporting curricular innovation. CAOs reported that 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, faculty, and other senior campus officials.[4]

But perhaps the most important outcome was an increased awareness of digital learning overall. Despite the explicit focus on digital learning and pedagogical resources in the Digital Fellows Project, some fellows expressed 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 are often laden with jargon and may seem far removed from the real instructional experiences and classroom concerns of faculty and academic leaders. For some Digital Fellows, the attempt to incorporate official

[4] The Digital Fellows Project 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 of the Digital Fellows Project overall. But even with the benefit of additional data from the final campus and project report, the long-term impact of the project and many of the individual campus initiatives may not be readily apparent for another three to five years.

(or referenced) definitions of *digital learning* into policy papers proved difficult. At one level, many of us can identify resources and experiences that seem to represent *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 in math or chemistry would, for most observers, qualify as a digital learning experience.

But these are just components—and 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 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 course-ware* mean. More than simply providing me an expanded vocabulary, the experience has helped me to understand that the 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."

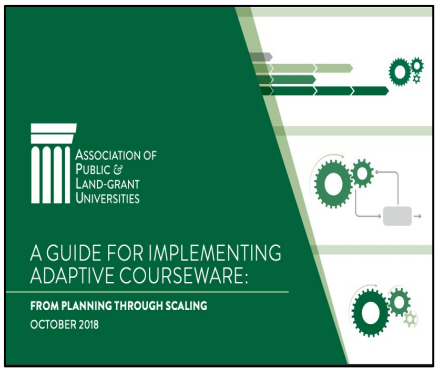
For these CAOs and others, there is growing recognition that "going digital" requires that faculty and departments *build in* rather than *bolt on.* In other words, simply appending digital resources to current syllabi is not an appropriate or necessarily effective strategy to leverage digital pedagogy. Rather, the conversation about "going digital" involves a larger—and for many CAOs and their institutions, long-overdue—discussion about course redesign: how students (of all ages and backgrounds) learn in this digital age, what they learn, and which resources and experiences support and enhance their learning.

Too, there is the importance of strong institutional recognition and support for the faculty who want to engage in the *scholarship of pedagogy*[5] and are prepared to redesign their courses to leverage and exploit the potential benefits of a wide array of digital resources. As noted in the comments of the ACAO Digital Fellows, "going digital" requires leadership, engagement, resources, strong support for faculty, and recognition that this is a substantial and long-term institutional commitment. Admittedly, not every course can or should "go digital." But we now have growing empirical evidence *and* significant institutional experience confirming that there are real opportunities to leverage digital pedagogies and resources in gateway and other courses that will enhance student learning and improve both student and institutional outcomes. ER

[5] See Ernest Boyer, *Scholarship Reconsidered*: *Priorities of the Professorate* (San Francisco: Jossey-Bass, 1990). Boyer, former chancellor of the State University of New York (SUNY) and later president of the Carnegie Foundation for the Advancement of Teaching, sought to expand academic scholarship into four categories: two traditional modes involving (1) original research and (2) synthesis and two expansive/nontraditional modes involving (3) the scholarship of application or engagement as an extension of traditional service functions and (4) the scholarship of teaching and learning, which today we might characterize as the scholarship of pedagogy.

ACAO Digital Fellows Program

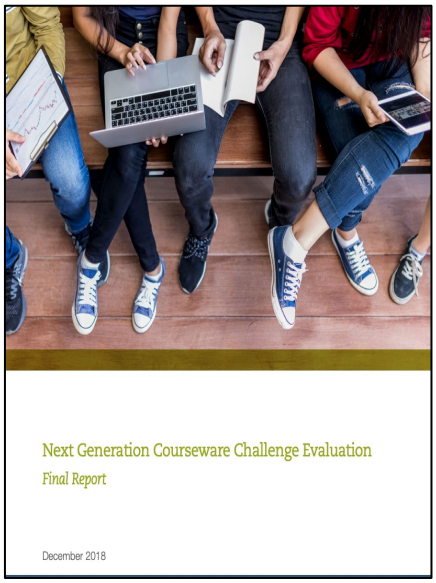
Key Resources & References
About Digital Pedagogy and Student Success



A Guide for Implementing Adaptive Courseware: From Planning Through Scalng.
Association of Public Land-Grant Universities (APLU), Oct. 2018.

The *Guide* draws on the experience of eight APLU-members institutions that agreed "to adopt, implement, and scale adaptive courseware to at least 15% of their general education course enrollments" over three years. Project goals included improving student success in general education courses and, in particular, leveraging adaptive courseware to better support low-income students, students of color, and first-generation students." Half of the enrollments were biology, chemistry, math and psychology courses. The participating institutions utilized course materials from fourteen different adaptive courseware providers.

The initial data on student outcomes, while promising, are also still limited, even as many of the participating campuses have "very powerful positive statistics about improved course success." The participating campuses also report that "students' cost of materials in the sections using adaptive courseware was lower than the cost of materials in nonadaptive sections."



The Next Generation Courseware Challenge. SRI Education, Dec. 2018

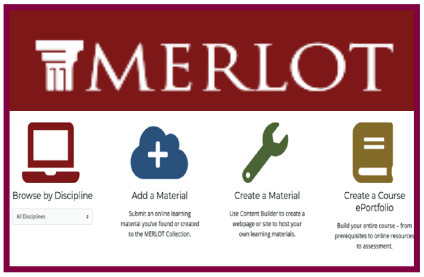
In 2014 the Bill & Melinda Gates Foundation launched the Next Generaton Courseware Challenge (NGCC) to encourage the development and adoption of courseware that would "surpass what's currently available in terms of quality, price, scalability, learning science engineering, design excellence, and improvement of student outcomes." The Foundation provided grants to seven organzations – a mix of start-up, non-profits, and academic entities – to test "the hypothesis that the implementation of high-quality courseware could improve course outcomes for students."

The SRI assessment focused on the courseware experience involving "138,000 under-graduates and over 1,000 instructors in 449 different higher education institutions during from 2015 to 2017." The impact of courseware on grades "varied wildly." However, the mean impact of NGCC courseware on grades was small but still statistically significant. Low-income students using NGCC courseware had grades that were slighly higher than their peers in standard courses. The majority of instructors (88%) were "moderately or highly satisfied" with the NGCC courseware they selected for their classes.

Not surprisingly, the report also notes that improving students outcomes is not just a matter of courseware: implemetnation issues, including "the amount of support instructors receive for using it, the role that instructors give the digital learning resources in their course, the fit between courseware content and the assessments that grades are based on, and the appropriateness of courseware content for the particular set of students in a course section—may all influence student outcomes."

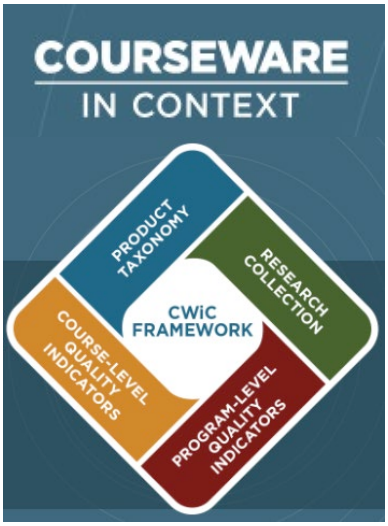
How Personalized Learning Unlocks Student Succcess. Nazeema Alli, Rahim Rajan and Greg Ratliff. *EDUCAUSE REVIEW*, 7 March 2016.

Citing examples from a number of campuses implementing various personal learning strategies, the authors write that "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." (At the time of publication the authors were all program officers at the Bill & Melinda Gates Foundation.)



The Merlot Project, California State University

The MERLOT system provides access to curated online learning and support materials and content creation tools, led by an international community of educators, learners and researchers. A largely volunteer organization supported primarily by the Californua State University (CSU) System, MERLOT serves as online repository for identifying, peer reviewing, organizing, and disseminating online learning resources, including both commercial and OER materials, across academic disciplines.



Courseware In Context. Online Learning Consortium (OLC) and Tyton Partners.

The CWiC Framework helps navigate the market of courseware solutions. It is designed to assist faculty and campus officials make better-informed adoption and implementation decisions with the goal of advancing the adoption of high-quality digital courseware in higher education and ultimately achieving improved outcomes for students. As a guide for broadening awareness and providing helpful decision-making tools, the CWiC Framework offers an inventory of product capabilities, as well as implementation considerations key to enhancing and improving blended and online teaching and learning with digital courseware.

High Tech - High Touch: Serving Student Needs at Scale. Digital learning reprot and workbook. Intentional Futures, 2017.

This report cites successful cases of digital implementation at scale and is intended to inform faculty and institutional leaders about effective tools and successful strategies to do so. Campuses can make the most of high-tech solutions by pairing them with high-touch, or student-centered, solutions. These two approaches, when used in tandem, can help catalyze digital learning initiatives aimed at improving student outcomes such as retention and knowledge acquisition

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