WILLIAM E. KIRWAN
CENTER *for* ACADEMIC INNOVATION

Pushing the Barriers to Teaching Improvement:

A State System's Experience with Faculty-Led, Technology-Supported Course Redesign

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Acknowledgements

The purpose of this report is draw on the experiences of the University System of Maryland (USM) with course redesign in order to make suggestions about how universities can improve graduation outcomes – who can learn and what they learn. For this reason, we rarely mention individual or institutional names in our discussion of the history of the USM course redesign initiatives.

However the initiatives were so beneficial and instructive that we want to applaud the work of Don Spicer, Associate Vice Chancellor for Information Technology and Chief Information Officer, and Nancy Shapiro, Associate Vice Chancellor for Academic Affairs and Special Advisor to the Chancellor. Don and Nancy patiently laid the groundwork for course redesign across the USM and then led these initiatives from beginning to end. Six Course Redesign Faculty Fellows provided leadership and did much of the work in the trenches to help faculty redesign courses in the initiatives that came after the Maryland Course Redesign Initiative (MCRI): Prof. Raouf Boules, Towson University; Prof. Megan Bradley of Frostburg State University, Asst. Prof. Ronald Gutberlet, Salisbury University; Prof. Jennifer Hearnes of University of Maryland, Eastern Shore; Lecturer Eileen O'Brien, University of Maryland, Baltimore County; and Dr. Marguerite Weber, then Director of Academic Initiatives, University of Baltimore. Asst. Vice Chancellor Stan Jakubik also played an important leadership role for some of the later cohorts.

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William E. Kirwan Center for Academic Innovation
Stephen C. Ehrmann, Associate Director for Research and Evaluation
MJ Bishop, Director

Executive Summary

To shed light on how institutions of higher education can make sustainable improvements in who can learn what they learn by the time they graduate, we have studied a series of initiatives by the University System of Maryland (USM) to improve the effectiveness and efficiency of selected courses. These redesigns incorporated a variety of learning-centered practices, that is, teaching practices that were chosen and applied using evidence of student learning.

USM's course redesign program was successful in achieving its immediate goals: test scores often improved, DFW rates dropped, and millions of dollars of faculty resources were freed for other uses. But many institutional conditions combined to make it difficult to create such courses and to attract typical faculty to develop and teach them. These barriers are serious enough to cast doubt on whether a "one course at a time" change strategy can succeed long enough and spread widely enough to improve graduation outcomes for that institution.

Therefore we suggest that institutions move on two fronts, simultaneously:

- Improve the effectiveness and efficiency of courses of study (e.g., degree programs, general education program) enough to improve graduation outcomes;
- Study barriers to such reforms in their own institutions and then transform at least some of them into foundations on which improved courses of study can be developed and sustained.

Part I. Lessons from USM's Experience with Course Redesign

The Redesign Program

In 2006, the University System of Maryland (USM) began what became a series of initiatives to redesign courses across the system, especially multi-section, lower division, gateway courses with unacceptably high DFW rates.[1] Faculty engaged in redesign began by clarifying the learning goals of a course and then developed a teaching strategy with the potential to achieve equivalent or better learning outcomes while using fewer faculty resources. This practice of beginning with what students need to achieve and then working backward to figure out how to make that happen is called *backward design*. (Wiggins and McTighe, 2005)

To each redesign team, the System Office offered $20,000 seed grants which institutions had to match with at least $20,000 of additional support. It took considerable effort by the initiative's leaders to attract enough faculty; they visited campuses and worked with their provosts throughout the process. Once a cohort of redesign teams had been assembled, workshops convened them about four times a year to learn the rudiments of redesign, to receive coaching as they developed and evaluated their new courses, and to support one another. The USM work had been inspired by the National Center for Academic Transformation; NCAT had previously defined and evaluated the concept of course redesign at

[1] DFW rate is the percentage of students registering for a course who later withdraw, or finish with D's or F's. In this report, we compare pre and post-DFW rates in terms of percentage points. If a DFW rate was once 20% but is now 13%, the report describes this as a 7-point decrease in DFW rates. Attachment A in this report summarizes the definitions we have used for terms such as course redesign, cost-saving, and teaching.

other institutions and provided extensive consulting help to USM in administering the first round of funding. Later faculty cohorts were supported by a team of USM administrators and Faculty Fellows who had each redesigned one of the first round of courses.

This Research Project

Our study has been supported by a generous grant from the Bill & Melinda Gates Foundation, part of a grant program helping state systems of public higher education explore how they might foster transformative change in their institutions. Rather than launching a new teaching improvement initiative with this Gates funding, USM instead decided to analyze its eight years of experience with course redesign.

Our research questions:

- Were the redesign efforts successful enough to persuade faculty and their institutions to continue and expand this kind of academic transformation once System support had ended?
- Did certain cultural and organizational factors make it difficult to sustain and expand course redesign?
- If that was the case, then how should universities foster sustainable, scalable improvements in teaching?

Evidence for this study was gathered from project and system documents, from site visits to all eleven USM institutions engaged in course redesign, from interviews and focus groups involving over seventy faculty and administrators (many interviewed more than once), and from a survey of the faculty leads of the redesigned courses. The survey asked respondents to describe how teaching was altered by their redesign and about some of the barriers to implementation that interviewees had mentioned. The authors of this study also used the literature and their own decades of experience in studying innovation in higher education to help interpret the USM evidence.

Finding: The grant-supported redesigns were usually successful

Fifty-seven courses were ultimately redesigned, incorporating many new learning-centered practices such as group work and computer tutorials in class, online homework with rapid feedback, use of video and online materials to substitute for some live lecturing, and coaching by undergraduate learning assistants. At the same time steps were taken to reduce the demands for faculty, such as reducing classroom lecture hours or increasing section sizes.

Now that the courses are all fully implemented, almost 35,000 students a year, mostly first- and second-year students, are benefiting from their improved teaching[2] approaches. (To put that number in perspective, USM annually educates 48-50,000 first and second year students.) When a pilot section or sections was run simultaneously with sections using the traditional design, students in the redesigned sections often earned higher grades on final exams. Meanwhile DFW rates declined by an average of seven percentage points, suggesting that about 2,300 more students pass these courses every year

[2] As used in this report, the term *teaching* includes any intentional activity aimed at helping students learn, not just the activity of explaining ideas to students.

thanks to their redesign. Through Academic Year 2013-14, over 143,000 students had registered for these enhanced courses (we have data from 55 of the 57 courses).

The improved teaching strategies also usually succeeded in freeing faculty resources for other purposes. Forty of the 57 courses reported on changes in faculty costs per student; if all forty were to revert to their old formats, an additional $1.8 million[3] in faculty resources would need to be found annually. Through Academic Year 2013-14, those forty courses had freed $7.5 million of the institutions' faculty resources.

Redesign was also intended to educate students in the same course more consistently, no matter what section they enrolled in; this "course drift" seems to have been reduced to faculty satisfaction.

Many proposals asserted that, by improving learning in the redesigned course, students would then be prepared to do better in more advanced courses. However, almost no one studied whether this actually happened and it was clear that such studies would be difficult to carry out, in part because doing such evaluations was not in anyone's job description.

These successes did help trigger some additional moves to improve student learning. The Regents decided to make academic transformation a central goal for their 2010-20 strategic plan for the system. As a result, institutional presidents were evaluated each year on their institution's progress toward that goal and academic transformation became a standard topic for monthly meetings of the System's provosts. The success of course redesign also helped persuade the Legislature to add several million dollars across the eleven degree- granting institutions to support work on academic transformation. Some USM institutions created positions in their provosts' offices to coordinate their work on academic transformation. Eight of the eleven institutions continue some support of course redesign.

Despite these advances, the efforts to improve the organization of teaching within the scope of limited institutional student resources remained, and remains, on the margins. A significant budget cut might eliminate most of these advances, sacrificing them in order to maintain mainstream ways of educating students.

Finding: A multi-pronged effort was essential

The course redesign initiatives demonstrated that it was possible to improve the effectiveness and efficiency of large enrollment courses because the initiatives were supported by:

- A widening consensus of leaders (from the legislature, Regents, and Chancellor to institutional leaders and Faculty Fellows) that grew symbiotically, with top leadership encouraging faculty, and faculty success encouraging a more consistent and sustained leadership from the top;
- Consistent messaging from the Chancellor's Office, within the System and out of state, about its pride in the System's progress in this area and the need for institutions to continue such progress year by year;

[3] Faculty working on a course redesign were asked to create a spreadsheet of faculty costs per student for teaching a traditional section and for a redesigned section. Some faculty updated these cost estimates after the development stage. To come up with an estimate of savings of faculty resources, we used that updated estimate when available and otherwise used the proposed savings per student.

- Required cost sharing between institutions and the System Office;
- Carefully crafted faculty development and, in later rounds, peer support from Fellows, and
- A variety of adjustments made by institutions such as classroom renovations and exceptions to faculty personnel policies.
- Last but certainly not least, the leaders of the initiatives and the institutional participants were good people who were committed to doing good things, even under adverse circumstances.

Finding: Using label of "cost-saving" both helped and hurt

NCAT has always used the label of "cost-saving" to denote freeing faculty resources for other purposes, implicitly treating this as the defining characteristic of course redesign. The allure of cost-saving attracted the engagement of senior leadership of USM and its institutions. But that same label repelled many faculty who equated quality with resources available per student; for these faculty, for example, larger section sizes would by definition be of lower quality. And most faculty saw their role as getting the most value from available resources, not finding ways to do as well as with less. This interpretation of "cost saving" led some faculty to see "course redesign" itself as an administrative ploy to cut budgets and faculty. USM's leaders were therefore caught between their desire to attract support from senior administrators and their need to attract redesign proposals from faculty. They coped by gradually saying less and less about cost savings. Today the eight USM institutions still centrally supporting course redesign have chosen to emphasize improving student learning but not 'cost-savings' or even freeing faculty resources. Several USM institutions are participating in the Maryland Open Source Textbook (MOST) initiative, coordinated by the Kirwan Center, in order to save students money on instructional materials.

Finding: The NCAT/System Recommendations for Evaluation Were Uneven

To gather data to appreciate the value of the program (summative evaluation), program leaders specified gathering data about DFW rates and faculty costs per student; they also asked faculty teams to find their own, additional ways to compare the quality of the pilot sections with the traditional sections, for example by comparing final exam grades. Unmentioned were whether and how to assess other important outcomes, such as cost to the students, value of passing a course rather than repeating it or dropping out of school, or fostering better learning outcomes in more advanced courses. Most importantly, we saw no evidence that faculty were receiving any guidance about how to assess student's deep understanding as opposed to their short-term memories. For example, was the automated feedback from software fostering deep understanding?

Also unmentioned was the potential value of data gathered to guide further improvement of the course (formative evaluation). Formative evaluation also deals with process rather than (just) outcomes. To use a baseball metaphor, knowing your batting average (outcomes data) doesn't offer any hints about how to increase your average, while videos of how you swing at different kinds of pitches would provide many such clues. Leaders could have, for example, provided some templates for midcourse and end of course feedback to explore which elements of the course were most, and least, engaging.

Initiative leaders were reluctant to impose many requirements for evaluation because they had no authority over the faculty and that the faculty's preparedness and willingness to gather data were limited. Nonetheless with a little more effort, a lot more could have been accomplished.

Finding: Leaders did not frame course redesign as faculty research

One of the reasons for the uneven requests for faculty data gathering was that NCAT and the USM initiative leaders did not see this work as faculty research, even though learning-centered practices, by definition, require scholarship, inquiry and experimentation.

As a result few faculty treated this work as a research project. Proposals rarely cited prior literature nor did they characterize their development work in terms of alternatives or hypotheses to be tested. Proposals did not include plans to document the work or to present findings for peer review and possible publication.

Nor did the USM leaders frame the initiatives as a systemwide study into the possibilities and limits of the course redesign strategy. The discovery that use of undergraduate learning assistants had a substantial impact on DFW rates emerged from this Gates-funded work, not from the initiatives themselves.

Finding: Challenging Conditions Made Implementation Hard and Spreading Innovation Harder

However, many conditions combined to keep learning-centered practices such as course redesign on the margins, vulnerable to the next budget cut or change in faculty participants or institutional leadership. We have grouped faculty and staff observations about these barriers into seven sets of institutional conditions:

1. *Lack of leadership from the top:* Faculty sometimes commented on the absence (or presence) of visible commitment by senior leadership to the idea that outcomes could and should be improved by rethinking teaching.
2. *Inadequate coalition of support:* Difficulties were encountered when there was weak support from other elements of the university, such as their chairs, influential colleagues, technology support, or assessment specialists.
3. *Clashing beliefs about teaching and learning:* Some faculty thought redesign was a bad idea because they believed that poor learning was always the product of less-than-capable students and that changing teaching strategies could only hide student incompetence. Some were uneasy with the teamwork demanded by redesign of multi-section courses because they saw faculty independence as a higher priority. Other faculty beliefs about teaching and the faculty role could also lead them to conclude that course redesign was not for them.
4. *Lack of prior faculty experience:* Some faculty were reluctant to become involved with such a big change because they were inexperienced with many of the elements of redesigned courses, such as framing learning goals or moderating students working in groups. Because they had so much to learn, they might conclude that redesigning a course would be too time-consuming or too risky.

5. *Inadequate infrastructure or services:* These barriers took many forms. Some courses needed more flexible classroom facilities and scheduling. Many institutions' departments lacked the will or capability to "own" and continually improve a gateway course. It was also crucial to have good technology support for courses that were often unusually dependent on technology. Many faculty discovered the value of relying on trained undergraduates to help facilitate a more active, collaborative class, but only a few few institutions had courses in place to train such assistants and give them academic credit for their work.
6. *Little help with evaluation:* By definition, learning-centered practice depends upon the use of evidence about what students are actually learning. But in many institutions, needed feedback loops were weak or missing altogether. For example, many proposals for course redesign cited the need for students to master the course well enough that they would do better in later courses. Yet, so far as we know, no institution offered help in doing so, and no faculty thought it was a normal part of their jobs to assess learning in later courses. Another example: for students to develop capabilities like critical thinking in their fields, it's valuable for them to do appropriate projects and receive constructive feedback; yet few institutions prepare faculty to assess such work in an effective, efficient way.
7. *Mismatches with current faculty personnel policies and practices:* Many faculty cited issues with definition of workload, pay for course coordinators, the nature of adjunct contracts and, of course, perceived risks to chances for promotion and tenure.

Many of these barriers combined to persuade a large majority of faculty that it would be too time-consuming and perhaps too risky to engage in redesign.

To repeat: these conditions need not be barriers. While some faculty cited poor technology support as a barrier, faculty elsewhere would cite good technology support as crucial to their success. Some institutions made adjustments to provide lasting release time for course coordinators, while others did not.

Part I has evaluated USM's efforts to improve the effectiveness and efficiency of single, selected courses. Part II applies lessons from that effort to suggest how universities might in the future make better use of available resources in order to improve graduation outcomes: who can learn (what kinds of students and how many) and capabilities they have developed by the time they graduate.

Part II. To Improve Graduation Outcomes Will Require Both Rethinking Courses of Study and Also Strengthening the Institutional Foundations Needed For Such Changes in Teaching to Flourish

Most institutions of higher education today want to improve their graduation outcomes: who can learn from the institution, what each of those students achieve and what they are capable of doing by the time they complete the program.

Decades of smaller-scale experiment such as course redesign have proved such improvements are possible if one uses evidence to rethink what students and faculty are doing in the program, judging methods by the learning they produce. Course redesign is hardly the only example of learning-centered practice. Solid research supports the potential of various high impact practices, curricular pathways, and fostering meta-cognition through the use of ePortfolios, for example.

Even so, such innovations are rarely adopted on a large-scale, sustained level. As was apparent in the study of USM course redesign, a variety of institutional conditions usually combine to stymy or erode large-scale reliance on learning-centered practices.

Therefore, to improve graduation outcomes, institutions should work energetically and persistently on two complementary fronts:

- Rethink courses of study in order to foster appreciable improvements in graduation outcomes;
- Making such large-scale reforms possible by transforming institutional barriers into foundations for easier use of learning-centered practices. With strong enough foundations, far more faculty are likely to use evidence of learning to rethink their teaching.

Recommendation: Rethink Courses of Study

Transforming one isolated course isn't enough to alter graduation outcomes for the mass of students, even a crucial gateway or capstone course. Therefore institutions should rethink courses of study as a primary strategy for improving graduation outcomes and do so within the constraints of available resources.

- A *course of study* is any set of courses, activities and services designed to have a cumulative, demonstrable impact on students' academic development.
- *Rethinking* means analyzing the goals, assessments and organization of academic work and then, to improve graduation outcomes, making selected changes in the course of study.

To take a step toward improving graduation outcomes, an institution ought to choose one, or a few, courses of study that are exceptionally promising candidates. Two interdependent criteria for making doing the first level of screening are:

- Whether enough faculty are prepared and are likely to remain motivated long enough to improve program outcomes,
- The potential importance and wider influence of making this particular improvement, and

Many institutions are already far along in the next step: clarifying what students completing the course of study need to have achieved, especially in describing the capabilities they need to have developed.

As with course redesign, faculty use those programmatic goals first to devise programmatic strategies for observing student progress. One use of that evidence: to help assure students from a wide range of backgrounds all get a reasonable chance to achieve at a truly high level.

With goals and assessment plans in hand, the next step for the planning team is brainstorm effective, efficient ways to improve outcomes. Time and money are at a premium, so what sorts of targeted changes can accomplish the most with the least? In some cases, the plan might involve small but pervasive changes in teaching methods such as signature assignments and efficient means of assessing them in large courses. In some cases the changes might be targeted, such as rethinking the role of the capstone course and then redesigning gateway courses.

It's unreasonable to expect faculty to do all these things alone, even with release time or grants provided. The faculty team should work closely with appropriate specialists such as program developers

from the teaching center, the academic technology unit, admissions or marketing (to spread the word about the revised program), facilities planning, and/or the office of online programs (if some or all of the offerings will be online).

Rethinking a course of study should continually gather and be guided by evidence. Institutions should also be prepared to demand and support a constructive, rigorous approach to gathering evidence to guide and ultimately to judge the reformed program.

In the end, the result should be a well-documented, widely valued improvement in graduation outcomes. The implementation of reform and, later, the visible improvement in graduation outcomes may well attract more and better students to the program, better placements for graduates, more philanthropic gifts, and an enhanced reputation for the program in its field.

By this point, readers may wonder whether such an initiative could succeed at their own institutions. It is a reasonable doubt, and the reason why institutions should simultaneously strengthen the foundations needed for such reforms to thrive.

Recommendation: Strengthen Seven Foundations for the Spread of Learning-Centered Practices

Part I of this report discussed seven potential sources of friction that could slow, erode or derail learning-centered reforms such as course redesign. We return to these seven but now focus on how to transform them into foundations on which more effective courses of study can be developed.

1. Leadership around four important ideas. Presidents, provosts, and deans can lead most effectively by teaching faculty and staff about a few core concepts and then backing people who apply those ideas appropriately. Improving teaching enough to influence graduation outcomes will take years, so top leadership needs to be energetic, consistent and persistent. We suggest that key ideas for creating an environment for improving graduation outcomes include:

- The feasibility and importance of clarifying graduation goals and improving graduation outcomes, especially outcomes for students from underserved economic and ethnic backgrounds;
- The necessity of using inquiry, experimentation and learning-centered practices to rethink the organization of academic work (faculty's, staff's and students'), starting with 'backward design' from graduation goals,
- The necessity of including the uses of people's time, money, and institutional facilities as an integral part of the improvement of teaching.
- The necessity of taking the long view: working by way of a series of steps, a few big, many small, as part of a cumulative process that could easily take a decade or more to completely unfold.

2. Strengthen the culture of using **cross-silo coalitions to work on problems and opportunities outside the reach of single units or individuals**; in the process, develop trust and confidence that such collaborations can deal with inevitable conflicts in order to accomplish something important. Many other recommendations in this report can only be tackled through such collaborations. Each cross-silo success can increase the chances that participants can and will work together successfully again. It's important to build such a foundation of mutual understanding early because initiatives to

improve the effectiveness and efficiency of entire courses of study will require many such collaborative efforts.

3. Explicitly **discuss and debate beliefs that influence faculty choices about whether to use learning-centered practices, especially on an ambitious scale**. Can changing teaching methods foster greater achievement by students? Or is student achievement determined strictly by the quality of students entering the program? Are courses about presenting content or also about contributing to the development of student capabilities? Is the faculty role only about working alone or also about working collegially, with a collective responsibility for student learning? Beliefs like these need to be discussable and people's decisions may influence future decisions about what kinds of faculty to recruit.

4. Encourage **far more faculty to try elements of learning-centered practice and become comfortable using them**. When an opportunity arises to rethink an entire of course of study, enough faculty need to already have at least rudimentary experience with elements of learning-centered practice such as framing learning goals, using technology to support more powerful teaching strategies, and facilitating group work in large classes.

5. Strengthen **institutional infrastructure and services needed for large-scale reliance on learning-centered practices**. For example, an institution rethinking several courses of study may well need:

- A strong, proactive teaching center capable of supporting multiple program teams simultaneously while also delivering other services,
- A means of training learning assistants that can help faculty more active and interactive forms of learning,
- Classrooms flexible enough to use for active and collaborative forms of learning and to be schedule in non-traditional ways, and
- Technology support services organized to help large numbers of faculty use technology-based services and resources so comfortably that they can shift to more powerful teaching approaches are made possible by those services and resources,
- Departments or program offices capable of academic improvements so that development can continue, even as individual faculty members join or leave the effort,
- Close working relationships among, or integration of, the teaching center, online programs, and academic technology support.

6. Provide **data and services to help guide student learning and to help faculty improve teaching and learning in their programs**. There are at least four uses of evidence that need to be dependable and effective in order for the institution to sustain and spread learning-centered practices.

- Helping more faculty learn to use effective, efficient ways to assess what student projects and papers reveal about the development of higher order capabilities of analysis, creativity, and synthesis.
- Helping faculty and students see learning outside the boxes of individual courses (for example through capstone courses, learning analytics, or programmatic portfolios)

- Improving the validity, value and use of student evaluations of course and other institutionalized student feedback processes.
- Help faculty and staff learn simple strategies to model programmatic uses of time, money, facilities and other scarce resources. This evidence is essential for figuring out ways to do better with available resources.

7. Work with institutions to **develop model faculty personnel policies and practices that can support wider use of learning-centered practice**. Areas of concern include:

- The criteria and evidence used in appointments, promotion and tenure;
- How faculty teaching loads are described and measured;
- Availability of release time or summer salaries to support faculty efforts to make major improvements in student learning;
- Rethinking which activities should be considered and compensated in contracts with part-time faculty.

As these foundations become stronger, the tempo of faculty work on improving student learning should increase. And as faculty become more comfortable using evidence and evidence-based techniques to make visible improvements for many kinds of learners in their courses, they also become more ready to undertake more ambitious, collaborative efforts such as the improvement of courses of study.

Bootstrapping Toward Improved Graduation Outcomes

We wrote first about large-scale direct action to improve graduation outcomes. In reality, these two kinds of effort are interdependent. Albert Hirschman's research (1967) on international development projects suggests as much. Selecting a development project requires first assessing conditions on the ground, he concluded: what local conditions are potential assets? Barriers? Is the work on the possible project going to require efforts to turn a local condition from a barrier into an asset? Hirschman's questions suggest the kinds of judgments administrative and faculty leaders need to make in figuring out their next steps.

To sum up, USM's experience with course redesign strongly suggests that, to improve graduation outcomes, higher education institutions will need to work on two levels simultaneously:

- Strengthening seven foundations needed for learning-centered practices to be sustained and to spread and, interdependently,
- Organizing initiatives to improve academic outcomes using available resources by rethinking courses of study.

Introduction

A growing number of administrators, faculty and other higher education stakeholders are grappling with the same challenge: how to visibly, substantially, and sustainably improve educational achievement of all their students, especially those from the lower half of the income distribution and from underserved minorities – groups with far lower prospects for graduating and attainment than other students. The good news: evidence strongly suggests that, by changing how students are educated, the chances for achievement by all students can grow significantly. (Witham et. al., 2015).

Of course, changing how a student is educated in college is no small task. Making it even tougher, the vise of limited resources continues to tighten, especially in public higher education where states are cutting back subsidies at the same time as demands upon those institutions are increasing.

So the real task is to figure out how to better educate students by making better use of available resources, the institution's and the student's: how to increase effectiveness efficiently.

Of course many academics see "effectiveness" and "efficiency" as opposed, rather than coupled. They assume that cuts in resources per student through budget cuts and enrollment increases inevitably cuts quality and effectiveness. By the same token, they may assume that an improvement in effectiveness will almost inevitably follow if budgets can increase and/or enrollments decline.

Technology, however, has been used for thousands of years to increase the quality of learning experience, the accessibility of learning, and the efficiency of learning, simultaneously (though not without some painful tradeoffs. It all started with books. (Ehrmann, 1999)

Over the last thirty years, several initiatives have been undertaken to improve both the effectiveness and efficiency of large enrollment lower division undergraduate courses. In the early 1980s, Ambassador Walter Annenberg committed $150 million to a project that would create dozens of telecourses of popular lower division college courses, each conceived by a multi-institutional team of academic stars; video was used not to show talking heads but rather to vividly illustrate ideas and deepen student learning (e.g., Goodstein, 1990). Course videos were usually shown on public television, where, in addition to students registered for the courses, millions of people watched them. The course materials were licensed by institutions and used to provide credit courses to tens of thousands of distant students. These courses often were often facilitated by adjunct faculty; faculty also usually spent much less time teaching these courses than would have been required if they were also responsible for organizing and presenting course content.

The development of "studio physics" at Rensselaer Polytechnic Institute (RPI) in 1993 and of the Math Emporium at Virginia Tech (VT) in 1997 each relied partly on computers to create a form of learning that was both more effective and efficient. RPI touted the fact that improved pedagogy could produce equal and better learning while reducing the number of instructors needed for a course that could now meet only four hours a week rather than six hours (two hours of lecture, two hours of recitation, and two hours of lab). (Wilson & Jennings, 2000) Similarly, VT suggested that, by using computer tutorials, learning could be improved or at least maintained while reducing demands on faculty. (Oblinger, 2006) Around that same time, Ron Bleed of the Maricopa Community College District pointed out that around

half of the district's enrollments were in about 25 of its course titles; if these courses could be enhanced, the improvements would have a disproportionate impact on the student body of one of the largest public systems of higher education in the country. (Bleed, 1998)

Inspired in part by those three developments, Carol Twigg began a project at RPI that eventually developed into the National Center for Academic Transformation (NCAT). From 1999 to 2004, NCAT worked with 30 two- and four-year colleges "to prove that it is possible to improve quality and reduce cost in higher education" by redesigning courses. NCAT argued that each of their five principles for course redesign could both improve learning and make better use of faculty time. For example, they said, learning happens best when students don't treat it as a spectator sport (effectiveness). Faculty can save time (efficiency) by relying on student working through materials and tasks online, applying ideas rather than just absorbing. This efficiency would be further increased if the number of class meetings a week were reduced, as they had been at RPI. NCAT reported that twenty-five of the initial thirty course redesign projects around the country showed significant increases in student learning; the other five showed learning equivalent to traditional formats. Of the twenty-four projects that measured retention, eighteen reported a noticeable decrease in drop-failure-withdrawal rates, ranging from 10 to 20%, as well as higher course-completion rates. Most dramatically, all thirty institutions reduced their costs by 37% on average, ranging from 20% to 77%, and produced a collective annual savings of about $3 million. (NCAT, 2015)

By 2006, NCAT achievements in cost-savings and quality improvement had attracted the attention of the USM Board of Regents. Their initiative led to a series of programs (2006-2014) to foster redesign of courses, mostly large enrollment courses with a history of high DFW rates, across the System. Ultimately 57 courses were redesigned[4]; evidence indicates that these courses touched many students, made meaningful improvements in DFW rates, and freed significant faculty time for other purposes. While this USM initiative also contributed to the decision of some institutions to continue course redesign on their own and/or to take other steps to improve learning, such activities remain largely on the margins of regular practice at USM institutions, at risk of erosion or disappearance.

Part I: Our Research Project and Course Redesign

In October 2013, the Bill & Melinda Gates Foundation requested letters of interest from state postsecondary education systems to explore systems' potential leadership role in facilitating long-term academic transformation aimed at improving access, affordability, and outcomes for students – particularly low-income, first generation students. Stated goals for the project included:

- Articulate the role and strategies of systems in statewide and institutional transformation
- Align current work and planning around a vision for transformation (goals, business and education models, processes)
- Assess and understand readiness, including gaps in work
- Begin to design solutions for those gaps

[4] A breakdown of the number of courses supported in each initiative, and at each USM institution, is included in Attachment C.

- Build on stakeholder engagement around transformation and/or prototype an existing or new solution/program/intervention
- Identify implementation issues along the way (resources and allocation, policy, change management, technology and data platforms, among others)

As one of 12 state systems chosen out of 40 applicants, the University System of Maryland (USM) chose not to use its award to begin a new innovation initiative. Instead USM would study eight years of past System experience attempting to foster transformation in its institutions.

Our research questions:

- Were the redesign efforts successful enough to suggest that, ideally, institutions should have continued and expanded this kind of academic transformation after System support had ended?
- Did certain cultural and organizational factors inhibit change and make some academic projects and innovations more sustainable and scalable than others?
- If that is the case, then how should universities design for scaling academic innovations within particular cultural contexts?

About USM: The System is a microcosm of public, four-year higher education. It consists of three research-intensive schools (including a professional schools campus), four comprehensive institutions located in a mix of urban and rural settings, three historically black universities (HBUs), one distance learning university, a degree-conferring center for environmental science, and two regional centers. USM is a federated system, run from a central office rather than from the flagship institution. The System does not include the state's community colleges. Leaders of the System, the two public institutions outside the system (Morgan State University and St. Mary's College of Maryland), the Maryland Association of Community Colleges (MACC), and the Maryland State Department of Education (MSDE) meet regularly. Maryland is a compact state, which enables more frequent face-to-face interaction among administrators and faculty than in larger states. Most institutions are within an hour's drive of one another.

Our plan was to look across the diversity of our system institutions to identify and then systematically explore the factors that were enabling or hindering the work on redesign, especially factors making it more or less likely that these funded redesigns would lead to a widening pattern of reform by the USM's institutions. From the data collected, we hoped to induce patterns of cultural and organizational behavior and construct a generalizable, research-based conceptual framework for starting to identify and explain the interplay between institutional culture and change strategies in order to better understand what will be necessary to bring academic innovations to scale. This framework might then be useful for other institutions and systems in their efforts to create sustainable, scalable improvements in the education of their students.

Research Methodology

From September 2014 through May 2015, over seventy individuals were interviewed or participated in focus groups. Many were interviewed more than once; a list of these people can be found in

Attachment E. Some of these interviews occurred during campus visits (each campus was visited at least once for the study) and many more were done by phone.

Leaders of the redesigned courses were also surveyed; the four sections of the survey asked about pedagogy of the redesigned course compared with the traditional version; any use of undergraduate learning assistants; any needs the course might have had for learning spaces; and policies that might have hindered or aided the redesign[5]. Findings from the survey are interwoven with other evidence in this report.

One issue we wanted to explore -- ways in which prior experience, or the lack of it, might influence faculty decisions about whether to engage in course redesign – couldn't be adequately explored through the survey. So we asked Faculty Fellows sponsored by USM's Kirwan Center for Academic Innovation to organize faculty focus groups on their campuses; invitees included all faculty members who had helped to redesign a course or to teach a redesigned course.

Planning documents, system documents such as the strategic plan and materials from the Efficiency and Effectiveness initiative, materials from the National Center for Academic Transformation, and final reports of each redesign were reviewed.

A useful white paper synthesizing much of the relevant literature concerning factors influencing efforts to change academic programs was written by Assoc. Professor KerryAnn O'Meara of the University of Maryland, College Park.

On June 25, 2016, representatives the provost's office and the faculty of all eleven degree-granting institutions were invited to the University of Maryland, Baltimore, for a day-long discussion of preliminary findings. Their responses were helpful in writing the final version of this report.

A Brief History of USM's Course Redesign Initiatives (2006-2014)

E&E and NCAT

In 2004, responding to economic challenges, USM's Board of Regents launched an "Efficiency and Effectiveness" (E&E) initiative to make better use of available resources. E&E began by discovering ways to save on administrative processes. By 2005, discussions were underway about achieving greater effectiveness and efficiency on the academic side of the house. Work began on three fronts: (1) faculty instructional workload, (2) increasing the number of credits taken outside the classroom, and (3) limiting the number of credits required to complete the degree.

In 2006, the Regents took a close look at work by the National Center on Academic Transformation (NCAT) on "course redesign" as another way to advance E&E goals in the academic program. NCAT's vision of course redesign involved making one set of changes in courses that were intended to advance two different goals: improving quality and "cost-saving," which was NCAT's label for efforts to reduce faculty costs per student and thereby free faculty time for other purposes. NCAT provided a course planning tool (National Center, 2015) to help faculty operationalize "cost saving" by using inputs of enrollments per section, number of sections, and the money value of the time used to teach traditional

[5] The survey form is available online at http://bit.ly/USM-CR-survey

and redesigned version of the course. (Faculty reports on estimates made with the course planning tool furnish the data reported here about the value of faculty time savings.)

In contrast to the precision with which NCAT framed and measured cost savings, its vision of "quality" was more multi-faceted, sometimes vague, and only partly measured by measuring change in DFW rates, comparing final exam scores and surveying students.

NCAT's approach to course redesign targets large enrollment, multi-section courses that usually have unacceptably high rates of "D" grades, failures, and withdrawals. For redesigning such courses in ways that improve quality and reduce costs, NCAT described a strategy organized around five principles, each of which was supposed to help advance both the quality and cost-saving goals (NCAT, 2005):

- Redesign the whole course and establish greater course consistency [across sections].
- Encourage active learning.
- Provide students with individualized assistance
- Build in ongoing assessment and prompt (automated) feedback
- Ensure sufficient time on task and monitor student progress.

Although not included as part of NCAT's formal model, several additional priorities were also emphasized in practice:

- Develop a new design that uses less (frees) faculty resources per student. At worst, do not add to the total expense of offering the course[6];
- Make use of technologies such as learning management systems and readily available commercial, online resources to help implement the preceding strategies. NCAT discouraged faculty developing new online material, even course videos, themselves. Using technology was not a goal of redesign, but every redesigned USM course made more use of technology than the earlier version of the course did;
- Collaborate to create the redesigned course. To help implement the project and reduce course drift, the redesign approach called for all section leaders to develop and stick to a shared set of goals, major assignments, and performance assessments. Because these courses were unusually dependent on technology and online materials, faculty often needed to work with instructional technology specialists as well.

Maryland Course Redesign Initiative (MCRI)

In early 2006, the Regents called upon the Chancellor, William E. ("Brit") Kirwan, to organize a Maryland Course Redesign Initiative (MCRI). USM quickly allocated about $500,000 of one-time money to MCRI, of which over $200,000 was allocated for matching grants to system institutions while much of the rest went to an NCAT contract to provide extensive consulting help over the three years of the MCRI.

[6] Maryland occasionally laid this restriction aside, allowing courses to add expenses in instances where student learning was problematic and per-student costs were already damagingly low.

The Regents expected quick action, so time was short. Each institutional provost was invited to nominate a single course for redesign and visits were made to many USM campuses to explain the ideas. The short time line and the need to ask Provosts to nominate a course or two (rather than soliciting potentially interested faculty to submit proposals) gave some faculty the impression that course redesign was a System mandate rather than a faculty opportunity. Nonetheless, all but one of the System campuses ultimately found a course to submit to MCRI. Course redesign began later in 2007. Daylong workshops led by NCAT were held periodically to train faculty and to create a sense of community among participants.

In spring or fall 2007, teams each offered a pilot section using the new methods alongside sections of their course that were still using the traditional design. The evaluation was an A/B comparison of outcomes and costs between these two ways of teaching students in the same course.

The early results were good. DFW rates were reduced, learning outcomes usually improved or stayed about the same, and faculty time was freed for other purposes. However, USM had made no further budgetary commitment to course redesign as MCRI neared its end.

Later Rounds of Funding, 2009-2014

Then, in 2009, Chancellor Kirwan received the $500,000 Carnegie Corporation Academic Leadership Award. He decided to use that award to raise more money from donors in order to fund several teaching improvement priorities, one of which was course redesign. Ultimately the Carnegie funding would support three more faculty cohorts, developing forty-one additional course redesigns in the System. All institutions were invited to submit proposals for each Carnegie round and decisions were made competitively; however, more often than not, the initiatives were only able to attract enough good proposals for the very limited funds they had available, despite guesses that ten times that number of courses might need to be redesigned. That contrast between expressions of interest and actual proposals suggests that most faculty might find reasons not to engage in a major teaching improvement project even if they saw some need to do so.

At about the same time as the Carnegie money was received, USM won a grant from the Lumina Foundation to sponsor redesign of developmental math courses in two- and four-year institutions across the state; this effort ultimately included the redesign of four more USM courses. Later, with support from Complete College America for additional work statewide, another USM course was redesigned.

In total, fifty-seven courses were redesigned across the system's eleven degree-granting institutions.

The Role of Faculty Fellows

For the Carnegie rounds of funding, USM named six Course Redesign Faculty Fellows, each from a different USM institution. Each had already led successful MCRI redesigns. To help manage the Carnegie cohorts, the Fellows reviewed proposals for redesigns and participated in selecting the winning proposals, developed and led workshops for the incoming faculty redesigners, worked to foster more redesign activity in their home institutions, and provided one-on-one coaching and peer support for colleagues from other institutions in their disciplinary areas. The Fellows also shared experience and insights with faculty designers about programmatic strategies, notably the use of undergraduate

learning assistants. The Fellows in many ways became the face of the Carnegie cohorts, not just within USM but also outside, due to their work writing articles, making conference presentations, and running workshops. As Don Spicer (Associate Vice Chancellor, System CIO, and one of the leaders of the initiatives) put it later, "We engaged them to help us, but pretty soon we were helping them!" The Fellows provided somewhat less help for the statewide Lumina and CCA cohorts. Each Fellow received a stipend of $6,000/year from the grants supporting these rounds of redesign.

Shifts Toward Learning-Centered Teaching in the Redesigned Courses

To improve learning outcomes, faculty needed to make much more extensive use of a variety of learning-centered practices while reducing reliance on lecturing, as revealed by our March 2015 survey of leaders of redesigned courses[7]. To respond on behalf of each of the 57 redesigned courses, we selected one faculty member, usually the leader of the original redesign; in the few instances where that person was unavailable, we sent the survey to the current leader of the course. After several rounds of reminders, we ultimately received responses from 44 of the course leaders.

We asked the respondents, "Which features of the redesign were intended to help students learn better than in the traditional version? Compared with the traditional version of your course, does your redesigned course…"

Answer options included "Much more than in the traditional version," "Somewhat more," "About the same," "Somewhat less," "Much less than in the traditional version," and "Not applicable."

In the table below, "Not applicable" responses were excluded from the calculation of percentages; To give a sense of how many faculty saw each strategy as "applicable", the table includes the number of respondents who selected a response from the range of "much more" to "much less" options. For clarity, the table also combines the "much" and "somewhat" responses on each side. In this table, the items are sorted by the size of the change from traditional to redesign.

Compared with the traditional version of your course, does your redesigned course....	Much or somewhat more	About the same	Somewhat or much less
Assign interactive software or web sites? (e.g., tutorials with auto-graded quizzes, simulations, …) (N=44)	93%	7%	0%
Require collaborative learning by students in classrooms or online? (e.g., discussion, debates, group project, peer critiques)? (N=32)	88%	9%	3%
Rely on students studying video instructional material (e.g., lectures, tutorials) (N=37)	84%	14%	3%
In class sessions, (1) ask students questions that require reasoning, not just a good memory; (2) then polling students (e.g., with clickers, cell phones) (N=30)	80%	20%	0%

[7] As noted above, the survey form is available online at http://bit.ly/USM-CR-survey

Compared with the traditional version of your course, does your redesigned course....	Much or somewhat more	About the same	Somewhat or much less
Assign work outside the classroom (e.g., field work, laboratory experiments, archival research) (N=32)	78%	19%	3%
Attempt to engage students with a variety of needs, degrees of preparation, abilities (rather than pitching the course to the average student, for example) (N=40)	73%	28%	0%
Assign challenging creative, research or other open-ended work? (e.g., papers, projects, compositions, etc.)? (N=37)	51%	46%	3%
Rely on students reading? (e.g., textbooks, articles, text materials online, etc.) (N=43)	49%	44%	7%
Rely on faculty lecturing, while students take notes. (N=43)	0%	21%	79%

The next section of the survey revealed that about 60% of the courses used *undergraduate learning assistants* (ULAs) -- undergraduates who previously had taken the course and were brought back to facilitate small group work, coach individual students, help with technology in the classroom and/or to help faculty with assessment. Many faculty were surprised by an unplanned benefit: the quality of ULAs' advice on how to improve teaching in the course.

The direct and indirect impact on DFW rates of using ULAs was quite striking, especially when ULAs were trained to think of coaching and facilitation as a research activity by developing hypotheses about how the coached students were thinking, testing those hypotheses by asking the students to do something, and then refining their coaching strategy. To put it another way, these ULAs were trained to see coaching as a learning-centered activity.

- Courses that made no use of ULAs succeeded in reducing DFW rates by only 2 points.
- Courses that used ULAs but that did not frame their work as research reduced DFW rates by 7 points.
- Courses that did frame ULA work at least partly as research achieved 10-point gains in DFW rates.

Benefits from the Course Redesign initiatives

Learning Benefits from the Redesigned Courses

Now that the courses are all fully implemented, almost 35,000 students each year[8] benefit from their improved teaching approaches. For a sense of scale, consider that almost all these courses were intended primarily for first and second year students; in USM today, each of those cohorts totals only about 24,000 students. Cumulatively (as of the end of Academic Year 2013-14), well over 140,000 students have experienced the improved teaching methods and materials in these courses.

[8] This total was calculated from annual enrollments in 55 of the 57 courses, counted from the year that each redesign was completed. We made the assumption that, averaged across all courses, enrollments would remain the same from that year until the present except in any cases where we knew the course was no longer offered.

When a pilot section or sections was run opposite sections using the traditional design, pilot students usually got higher grades. DFW rates declined by an average of seven percentage points, suggesting that annually about 2,300 more students are passing these courses thanks to their redesign. Using that seven point gain, we estimate that, cumulatively, almost 35,000 additional students have passed those courses thanks to their redesign.

The new designs were also intended to assure that students in different sections of the same course would study mainly the same content and would be assessed in the same ways. That goal seems to have been widely achieved, although faculty rotating later into teaching the course sometimes objected, asserting that this would infringe upon their academic freedom, compel them to spend time preparing to teach material that they otherwise would have omitted, and force them to abandon some material that was in their primary area of expertise.

A frequently stated goal in redesign proposals was to improve learning enough that students would do better in later courses. In practice, faculty almost never found it possible to determine whether this actually happened. Redesigned courses were rarely a unique prerequisite for a more advanced course, nor did students necessarily all take the later course and take it in the same semester. Many faculty saw such an evaluation of downstream learning as being outside their normal responsibility; the funding program did not require such reports, either. Because any such benefits remained invisible, other faculty in the department and institution were less likely to feel that they personally had benefited from their colleagues' success in redesign.

"Cost-Savings" from the Redesigned Courses

Most redesigns were also intended to free faculty resources for other uses such as teaching more advanced courses, doing research, or enabling the same course to handle more students without harming learning outcomes.

The improved teaching strategies also usually succeeded in freeing faculty resources for other purposes. Forty of the 57 courses reported on changes in faculty costs per student; if all forty were to revert to their old formats, at least an additional $1.8 million[9] in faculty resources would need to be found annually. By the end of AY2013-14, those forty courses had cumulatively freed $5.8 million of the institutions' faculty resources[10] for other uses.

As we discuss below, the label of "cost-savings" was controversial among faculty. However, adherents to the NCAT model insisted on continuing to use the term. When it became clear that the label of "cost-saving" was repelling potential applicants to whom this seemed inappropriate, leaders downplayed their

[9] Most proposals included a spreadsheet of faculty costs per student for teaching a traditional section and a redesigned section. In some cases a second estimate was made after the pilot test, revising those cost estimates. Where we have that revised estimate we used it; otherwise these estimates come from program plans. Note: as enrollments per section go up or down, costs per student would go down or up since only the value of faculty time per student is being estimated.

[10] This total only refers to faculty resources the department no longer needed to allocate to the course. Shifting faculty time from lecture to fostering active learning in the course does not count against this total, nor do dollars that were used to pay ULAs instead of adjunct faculty.

push for cost-saving. This may help account for the number of final reports that did not update their spreadsheet estimates of faculty costs per student.

A New Strategic Plan Amplifies the Results of Course Redesign

In 2010, the year when MCRI results were in hand and both Carnegie and Lumina funding began, the System published a new 10-year strategic plan that identified, as one of five themes, "transforming the academic model." The plan asserts that, "many elements of the academic model under which we have been operating for the last century are becoming unsustainable financially, outdated pedagogically, and obsolete technologically. Not least among these forces is growing public demand that our institutions be more forth- right and accountable for what they expect graduates to learn and be prepared to do" (University System of Maryland, 2010, p. 17). The plan called for USM institutions to triple the number of course redesigns (which the Carnegie and Lumina-funded initiatives would be able to do), to create a process for identifying and supporting additional transformational efforts, and to create a set of learning goals for all USM graduates.

Halfway through the ten years of the plan, the System has fully implemented the first goal of redesigning more courses and taken strong steps to advance the second goal in part by establishing and funding the Kirwan Center and partly through institutional actions summarized in Attachment C. The goal of clarifying what graduates need to have learned, essential for making courses of study more learning-centered, has been pursued mainly at the departmental and institutional levels.

Impacts at the System Level

Leaders of the initiatives hoped that institutional experience with redesign grants would encourage additional work financed wholly with institutional funds. That was one reason the initiatives required that institutions match the $20,000 System grant with at least that much additional money; state system leaders hoped that this initial institutional commitment of matching funds would lead to larger, lasting allocations of institutional funds to redesign courses on a regular basis. Faculty Fellows also encouraged spread the word about course redesign within their institutions and more widely.

USM's 2010 strategic plan made "academic transformation," not "course redesign," a major priority. For the first few years the two terms were used almost synonymously. Gradually use of "academic transformation" broadened to also other efforts to improve student success by changing learning environments to make higher education more accessible, effective, and affordable.

To help implement the strategic plan, Chancellor Kirwan made "academic transformation" an annual performance goal for all USM institutional presidents. "Academic transformation" also became a standing agenda item for the monthly meeting of USM provosts and was frequently a topic on the agenda of other system-wide meetings of senior officials.

The continuing success of course redesign and the efforts to spread the word helped justify the argument that more state funding was needed. For FY2014, the System received enhancement funding that, in combination with institutional matching, (re)allocated $5.8 million to academic transformation across USM institutions. The institutions were required to report for three years on their use of these new base budget funds.

Sometimes aided by those enhancement funds, a wide variety of academic transformation efforts sprang up across USM institutions, as illustrated by the brief institutional summaries in Attachment C. Our impression is that (a) these activities are significant departures from the status quo but (b) most of them remain marginal enough that they could at any time fall victim to budget pressures on the institutions.

In 2013, to help the System's institutions pursue their academic transformation goal, a new System-level center was created, recently renamed the "The William E. Kirwan Center for Academic Innovation." The strategic plan, the inclusion of academic transformation in presidential performance goals, FY14 Enhancement funds from the Legislature, and the creation of the Center were among the stimuli leading many USM institutions to appoint a staff or faculty member to coordinate their own institutional work on academic transformation. These positions each had a different title. For example, the University of Maryland, College Park, created a Teaching & Learning Transformation Center and named its first Associate Provost of Learning Initiatives to be its Executive Director. Bowie State University has an Assistant Vice President for Institutional Effectiveness. And Towson University has an Assistant Provost for Academic Innovation.

The Kirwan Center has organized representatives from each institution into an "Academic Transformation Advisory Council (ATAC)" that meets about eight times a year and works on strategic initiatives as well as policy questions relating to the System and the legislature. As of this writing, seven of the fourteen participating USM institutions (including the 2 regional centers) have full-time academic transformation leadership positions in the Provost's Office/Academic Affairs. The other seven institutions have appointed academic transformation leaders who, as a dedicated part of their full-time duties, work regularly with their institution's Provost's office on these initiatives and represent their institutions on ATAC.

In addition to giving each member a sense of context for their novel roles, ATAC also quickly became a platform for considering shared priorities and potential collaborations. Among ATAC's early efforts:

- A project (the Maryland Open Source Textbook initiative) to help interested faculty to reduce the cost of instructional materials used in their courses by relying on open source resources instead.
- A shared investigation of platforms for competency-based education.
- A shared investigation into the potential of badging.
- Shared input into potential legislative policies affecting the use of social media in courses.

The Kirwan Center has also organized a system-wide Council for Program and Faculty Development (CPFD), which brings together leaders of teaching centers and faculty development programs to help each other more effectively foster teaching improvement in their institutions. Prior to CPFD's inaugural meeting in December 2014, some of these leaders had never even met each other. Institutional teaching improvement programs all have very limited budgets and staff. CPFD was created to help them multiply one another's efforts. For example, single institutions have little bargaining power over conference fees. The Lilly International Spring Conference on College and University Teaching and Learning is held each year in Bethesda, Maryland. With leadership from the Kirwan Center, CPFD

members pooled their institutional commitments to support faculty registration for the conference. Some CPFD members found they had more leverage to get funding for faculty to attend because of the System's endorsement of the conference. With those commitments in hand, the Kirwan Center was able to negotiate a significant discount in registration fees, enabling more faculty and graduate students to attend. In Spring 2015, CPFD members worked in task groups to discuss how they might share materials useful in running teaching programs, how to gather and use evidence to make the case for program and faculty development efforts, and how to create a more demand for these resources and services. In the coming year or two, CPFD could help:

- Create System-wide initiatives (for example to support the scholarship of teaching and learning) in which member institutions and their faculty could participate.
- Share the work of creating faculty development resources that could then be adapted for local use by CPFD members.
- CPFD members to work in small groups on tasks that are of high priority for them. For example, representatives from two institutions are already working together on improving questions for student course evaluation forms.

Lessons Learned from the Implementation Process

The course redesign initiatives demonstrated the possibility for making substantial improvements in large enrollment courses when supported by a number of independent factors.

Programs need good people committed to doing good things, even in challenging circumstances.

We were impressed by the determination of faculty and initiative leaders to help students learn better. Their intelligence, curiosity, lack of ego, persistence, and good humor all helped make the initiative work at the system, institutional, departmental and course levels. Having enough people of this caliber is hard to plan for, but it can make or break an initiative of this type.

A widening consensus of leaders was essential

Course redesign began from interests of some Regents, staff in the Chancellor's Office, and staff in a few institutions. This critical mass of leadership grew symbiotically, with top leadership encouraging faculty, and faculty success encouraging a more consistent and sustained leadership from the top.

Consistent messaging from the Chancellor's Office, within the System and out of state, also helped.

The Chancellor and others periodically trumpeted their pride in the initiatives' accomplishments. The Regents' new strategic plan led to holding campus presidents accountable in their annual performance reviews for institutional progress toward academic transformation. As mentioned earlier, monthly meetings of system provosts always have "academic transformation" as an agenda header. The System became known nationally for its accomplishments in the area because, according to the Chancellor, he took every chance he had in national fora to express his pride in the System's leadership in this area; the respect for, and visibility of, Chancellor Kirwan also helped spread the sense in other states that USM was a model. Don Spicer, Associate Vice Chancellor for Information Technology and Chief Information Officer, and Nancy Shapiro, Associate Vice Chancellor for Academic Affairs and Special Advisor to the Chancellor, frequently visited campuses to explain course redesign, to build local support for the effort,

and to explain it to potentially interested faculty. Informational sessions often attracted substantial faculty attendance (although far fewer eventually submitted proposals, which suggests how many barriers might discourage participation, even after people learn about the program.

Responsibility for the initiatives was shared the System Office and the institutions

The symbiotic roles played by the System Office and the campuses were visible in many areas, most obviously in the 50:50 cost sharing. System leaders supported campus provosts in engaging faculty. Campus leadership needed to line up resources (e.g., renovating classrooms) and adjust policies. Campuses provided technology support but relied on the System to provide training and consulting for faculty. Later sections of the report will return to the question of institutional accommodations.

Faculty development was carefully crafted.

The original NCAT workshop scheme was later the basis for workshops led by the Faculty Fellows and System Office leaders. An introductory workshop in October 2006 laid out the basic principles for redesign. Workshop II in January 2007 helped faculty teams develop their own plans for their courses. The main work of redesign was done in the summer. The faculty were convened again later to share results of their pilot offerings.

Failure and frustration also can suggest lessons for the future.

Clashing interpretations of "cost-saving" interfered with implementation.

As noted above, NCAT insisted that "cost-saving" be used to label the strategy of freeing up faculty time. The label helped attract backing for the initiatives from administrators and state government. In the strategic plan for 2010-2020, the first justification for academic transformation cited by the Regents was that "many elements of the academic model under which we have been operating for the last century are becoming unsustainable financially." The Regents may or may not have understood that course redesign was having little or no impact on total budgets but rather enabling better use of the resources in hand. Meanwhile, many faculty wrongly surmised that "course redesign" was an administrative move to cut budgets and faculty. Engaging faculty may have been easier if the priority had been labeled "conserving faculty resources," if "improving access and learning with available time, money and facilities" had been presented as a single academic (and research) challenge. The University of Pennsylvania had already provided a vivid example of just that with its initiative to make its undergraduate engineering laboratories both more effective and also more efficient (Powell et. al., 2002)

NCAT/System Recommendations for Evaluation Were Uneven

This left-hand column of the following table notes dimensions of quality as defined by NCAT and the initiatives, while the right-hand column summarizes the priorities set by leaders for data-gathering.

Facet of quality arising in NCAT or USM materials or interviews	What data were routinely gathered to measure this facet of achievement?
Reducing rates of "D"s, "F"s and Withdrawals	DFW rates calculated from institutional data
Improving student learning outcomes	Most often faculty compared final exam scores of redesigned and traditional sections; however, many reports did not specify whether the final exam was identical for the two types of section. Students were sometimes surveyed about their reactions to the redesign. In a few courses, rubrics were used to compare papers or projects. We found no evidence that faculty were prepared to analyze whether an assessment was measuring short-term memory or also deeper, most lasting learning and capabilities such as critical thinking.
Improving success for students from low income backgrounds or underserved minorities	Many redesigned courses served large numbers of students from these populations. But initiative leaders did not recommend break down outcomes by student demographics.
Increasing the consistency across sections of learning goals, course activities and tests. (Reducing "course drift")	No measure was suggested for measuring similarities or contrasts across sections.
Improving learning enough in the redesigned course that those students would do better in later courses	No methods were suggested for how to discover whether this frequently mentioned goal was being achieved.
Cost-Savings for the institution	Measure faculty resources per student but not cost of space, gains from higher pass rates, or costs of developing and maintaining a more materials-intensive approach to teaching.
Cost-savings for the students	No measures were suggested for direct costs of materials or not having to retake the course, or other gains (students who drop out partly because they fail a course are likely to have lower lifetime earnings but still have student loans to repay).

Also unmentioned by initiative leaders was the value of data to guide further development (formative evaluation). Formative evaluation often requires a different kind of data, usually about the process of producing outcomes. To use a baseball analogy, knowing your batting average (outcomes data) doesn't offer any hints about how to increase your average. But videos of the ways you swing at different kinds of pitches would provide many such clues. Initiative leaders could have, for example, provided some

templates for midcourse and end of course feedback to explore which elements of the course were most, and least, engaging and encouraged faculty to use classroom assessment techniques such as "muddy points" to get a day-to-day sense of where instruction was or wasn't working.

Initiative leaders were reluctant to impose many requirements for data-gathering because they had no authority over the faculty. They also knew that the faculty's preparedness and willingness to gather data were limited. Nonetheless with a little more effort, even more useful data could have been gathered for use by the faculty and by the leaders of the initiatives.

Course redesign was not usually characterized as faculty scholarship.

One of the reasons for the uneven requests for faculty data gathering was that NCAT and the USM initiative leaders did not see this work as faculty research, even though learning-centered practices, by definition, require scholarship, inquiry and experimentation. As one academic administrator pointed out in an interview, "Course redesign wasn't seen as a research effort. It was just money that was available, put into hands of faculty." The requests for proposals did not frame the projects as faculty research. Nor did the leaders of the initiatives suggest to the provosts, deans or chairs that faculty receive any recognition in their dossiers for any findings emerging from their inquiries and experiments. Nor did the System set aside resources for the initiatives to study what could be learned from the projects collectively; such research had to wait until this Gates grant. Some faculty did choose to treat their work as research and there was some mutual support among faculty to do so.

Even More Could Have Been Done to Lay the Groundwork for Institutionalizing Course Redesign

The leaders of the initiatives by and large did an excellent job in this area, working closely and continually with campus leaders, requiring an institutional match for grant funds, naming Faculty Fellows and asking them to do outreach to faculty at their institutions, and more.

Three additional steps might also have been helpful. First, there was no systematic effort by initiative leaders to engage teaching centers, faculty development programs, and leaders of online program development with course redesign. Even they had simply invited those staff to all course redesign workshops, it might have helped build supports needed for later institutional work on academic transformation. Second, more might have been done to draw on the expertise of the University of Maryland University College, an almost wholly online institution that, after MCRI, was going its own way with course redesign. Third, there was no system-wide effort to bring the relevant chairs together and work with them on why and how they might support current and future redesign work.

Many institutions took some time to allocate even a little base budget to support academic transformation.

The practice of course redesign might have spread further had the System office felt able to make a sustained investment of money and staff time in the work. USM had made a single, one-time allocation of funds for the MCRI. After MCRI, the work was supported by gifts, grants and the time of two interested senior officials in the Chancellor's Office. Around the time the System initiatives were ending and when some additional money was made available in the FY14 budget, some USM institutions did

allocate base budget to academic transformation; some of these changes are summarized in Attachment C.

Challenging Conditions Made Implementation Hard and Spreading Innovation Harder

Many conditions combined to keep learning-centered practices such as course redesign on the margins, vulnerable to the next budget cut or change in faculty participants or institutional leadership. We have grouped faculty and staff observations about these barriers into seven sets of institutional conditions:

1. *Lack of leadership from the top:* Faculty sometimes commented on the absence (or presence) of visible commitment by senior leadership to the idea that outcomes could and should be improved by rethinking teaching.
2. *Inadequate coalition of support:* Difficulties were encountered when there was weak support from other elements of the university, such as their chairs, influential colleagues, technology support, or assessment specialists.
3. *Clashing beliefs about teaching and learning:* Some faculty thought redesign was a bad idea because they believed that poor learning was always the product of less-than-capable students and that changing teaching strategies could only hide student incompetence. Some were uneasy with the teamwork demanded by redesign of multi-section courses because they saw faculty independence as a higher priority. Other faculty beliefs about teaching and the faculty role could also lead them to conclude that course redesign was not for them.
4. *Lack of prior faculty experience:* Some faculty were reluctant to become involved with such a big change because they were inexperienced with many of the elements of redesigned courses, such as framing learning goals or moderating students working in groups. Because they had so much to learn, they might conclude that redesigning a course would be too time-consuming or too risky.
5. *Inadequate infrastructure or services:* These barriers took many forms. Some courses needed more flexible classroom facilities and scheduling. Many institutions' departments lacked the will or capability to "own" and continually improve a gateway course. It was also crucial to have good technology support for courses that were often unusually dependent on technology. Many faculty discovered the value of relying on trained undergraduates to help facilitate a more active, collaborative class, but only a few few institutions had courses in place to train such assistants and give them academic credit for their work.
6. *Little help with evaluation:* By definition, learning-centered practice depends upon the use of evidence about what students are actually learning. But in many institutions, needed feedback loops were weak or missing altogether. For example, many proposals for course redesign cited the need for students to master the course well enough that they would do better in later courses. Yet, so far as we know, no institution offered help in doing so, and no faculty thought it was a normal part of their jobs to assess learning in later courses. Another example: for students to develop capabilities like critical thinking in their fields, it's valuable for them to do

appropriate projects and receive constructive feedback; yet few institutions prepare faculty to assess such work in an effective, efficient way.

7. *Mismatches with current faculty personnel policies and practices:* Many faculty cited issues with definition of workload, pay for course coordinators, the nature of adjunct contracts and, of course, perceived risks to chances for promotion and tenure.

Many of these barriers combined to persuade a large majority of faculty that it would be too time-consuming and perhaps too risky to engage in redesign.

These conditions make it harder to attract faculty to redesign a course. They can also make it harder to maintain the effectiveness and efficiency of a course whose redesign was supported several years earlier. Cummings et. al. (1999) documented how pioneering redesigned STEM gateway courses at RPI initially aided learning while reducing faculty costs per student but then, over the years, how the redesigned courses invisibly began sliding back toward the older ways of teaching and higher costs per student.

To repeat: these conditions need not always be barriers. For example, while faculty in some institutions cited poor technology support as a barrier, faculty elsewhere cited good technology support as crucial to their success. Some institutions made adjustments to provide lasting release time for course coordinators, while others did not.

Part II: Applying the Lessons of USM Course Redesign to Future Strategies for Improving Graduation Outcomes

We will argue in this part of the report that, to improve who graduates and what they can do, it makes sense to help faculty rethink the courses of study meant to produce those outcomes, shifting and refining their approaches in light of the evidence[11]. We will argue further that, for any such strategy to succeed, institutions also need to transform unfavorable conditions into foundations that can sustain these learning-centered approaches to teaching on a large scale.

Institutional Action to Improve Graduation Outcomes by Rethinking Courses of Study

Transforming one course isn't enough to alter graduation outcomes for the mass of students, especially not the redesign of a single lower division course. For example an enhanced freshman composition course cannot assure a graduating class of good writers; in fact STEM students' writing seems to deteriorate from freshman to senior years, at least in part because they get less practice and feedback on their writing (Whitla study cited in Bok, 2009: 88-89). Bahrick (1984) found that students who took one course of Spanish lost it all within two years, whereas students who took several courses would begin losing some knowledge exponentially; however, after a time the loss would stop and the former students would retain their remaining competence for decades. This research helps explain why a single course in "world cultures" should not be entrusted to educate graduates who can understand other cultures. Nor can the development of "critical thinking" simply be handed off to a general education program; the major, too, needs to develop these and other essential learning outcomes.

In short, the best way to improve graduation outcomes is to make a set of mutually reinforcing, cumulative improvements in elements of the student's entire course of study.

- A *course of study* is any set of courses, activities and services designed to have a cumulative impact on students' academic development. A degree program, a minor, a program to systematically develop students' citizenship and leadership through their co-curricular activities, and a quantitative reasoning across the curriculum program may all be courses of study. Not all these courses of study end with students graduating, but we will use the phrase "graduation outcomes" to describe who learns from the course of study and what they have learned by the time they complete it.
- *Rethinking* means taking a fresh look at the goals, assessment, teaching methods and resources used throughout the course of study, and then making a set of strategic changes most likely to improve who can graduate and what they can do by making different use of people's time, budgets, and institutional facilities.

[11] In this report *evidence* is used more or less interchangeably with terms such as observations and results. Empirical studies such as those by Schneider et. al. (1981) and Bain (2004) found that faculty widely regarded as superlative college teachers also tend to guide their work through close observation of how students are learning, or failing to learn, altering methods and tactics in order to give all students in their courses a realistic opportunity to do the work.

Rethinking a course of study also enables faculty to focus explicitly on developing capabilities and perspectives that are clearly beyond the reach of a single disciplinary course. The possibilities not only include the graduation goals of the course of study itself (e.g., preparing some psychology graduates to practice as counselors) and the university's essential learning outcomes (e.g., written and oral communication) but also influencing how learners learn. For example,

- *Develop a malleable rather than a fixed perspective*: Challenge the view of some students that what they can do is solely a result of their talents (or lack of talents) rather than mostly a result of their work leading up to and during their course of study. (Dweck, 1986) Unchallenged, these views lead well-prepared students that hard work is unnecessary and ill-prepared students to think hard work is unproductive and perhaps that various forms of cheating are a more efficient, time-saving way to get a degree.
- *Developing more effective and committed approaches to studying.* Socializing students to spend substantially more time studying than is currently the norm. As we mentioned above, when students' habits of study are geared to judging their own mastery and learning for their own reasons (deep learning), the learning is more likely to last. But when faculty emphasize coverage and high stakes testing, even students who enter a course prepared to engage in deep learning are likely to shift to using only the teacher's feedback to guide their studies, leading to surface learning that fades quickly. The converse is not as true: when students geared to studying for grades enter a course taught by a faculty member encouraging deep learning, they may or may not change. (Gow & Kember, 1993; Trigwell, Prosser & Waterhouse, 1999) A course of study that consistently encourages students to engage deep learning, in course after course, is more likely to produce learning that lasts.
- *Socializing students to invest more time in studying.* Arum and Roksa (2011) argued today's students have fallen behind undergraduates of thirty years ago in their development of higher order thinking skills. They asserted that one reason is that today's students spend perhaps half the time studying. Maintaining a part-time job does not seem to be the reason, as employed students also study about half the time they did thirty years ago (Babock and Marks, 2011). When one faculty member assigns more homework than students perceive as normal, those students may well ignore or shortchange some of the assignment and assert that it was unfair. But if most of the courses in a program assign homework that is engaging and that rewards intense effort, students are probably more likely to reorganize their time so that they can work long enough.

Thinking of a course of study as a whole (whether all students take identical courses or not) also suggests ways of changing the structure. For example:

- *Creating far more ways for faculty and students to assess student learning from course to course, from day-one assessments to capstone courses and ePortfolios.* Learning can decay quickly, especially when teaching encourages students to continue focusing on grades rather than on using their own curiosity and desire for mastery to guide their studies. When learning from a course is assessed only during that course, both the instructor and the students are blinded to whether the student continues to develop their capabilities later on or whether their

apparent mastery deteriorates within weeks. Faculty and students can get better information if the faculty plan at the level of the course of study. In the next section on strengthening foundations for learning-centered practices, the report discusses how this might be done in more detail.

- *Rethinking effectiveness and efficiency can be more meaningful when the change is made at the level of the course of study.* Imagine, for example, that a course of study has been teaching essentially the same capability in course after course because, when students take later courses, they don't seem remember much of what they had been taught earlier. By rethinking how the course of study is organized, faculty may well develop a more effective way to develop the capability on the first try, while also developing more effective, efficient ways to help students refresh their understanding when they need the capability in later courses. Another example: In a consortium of small colleges in Texas, the Texas Physics Consortium[12], majors take online courses, each taught by one of the members of the consortium. The move was spurred by the threat the board would shut down majors that had too few students. Acting together, these colleges have become third largest educator of physics majors in Texas.

To improve graduation outcomes while working within the constraints of available resources, the most promising option is for faculty to rethink courses of study.

As a first step to deciding which faculty teams to support, an institution ought to send out a request for interest and then screen respondents to identify exceptionally promising candidates. Two interdependent criteria could be useful for the first level of screening:

- The potential importance and wider influence of making this particular improvement,
- Faculty who are motivated to keep up the team effort over a period of several years or more,
- Faculty who are prepared to work on contentious teaching questions not only within the same department but also with collaborators from other departments (few if any courses of study are entirely taught by faculty from the same department).

Possible sources of faculty motivation: Not all departments and programs feel a strong incentive to make a change, but at almost any time there are at least a few that do. Some faculty may feel pressure to raise their program's standing in the eyes of employers or, in the case of undergraduate courses of study, in the eyes of graduate schools. Some faculty may already share a conception for how to rethink the course that excites them intellectually. If the reform can attract new resources to the institution, faculty and staff may have reason to believe that their contributions could give them more leverage for promotions and better positions.

Once a team is ready to do some preparatory work, the next step may be to clarify graduation goals: what should students completing the course of study need to have achieved and what capabilities must they have developed and documented. Some faculty might be reluctant to engage because they fear that programmatic goals inevitably reduce a course of study into atoms of routinized skills and memorized content. To at least partly allay that fear, those faculty might be offered some examples

[12] For more information about the Texas Physics Consortium, see http://www.tarleton.edu/tpc/.

where faculty have chosen programmatic goals such as preparing students to respond to unscripted problems in their field, to question received wisdom, and to use evidence to decide on an effective course of action. Those essential learning outcomes are useful for work in a discipline or profession, for civic engagement, and for coming to a new sense of identity and purpose in life. They certainly cannot be reduced to tiny modules of behavior modification. Nor do such goals imply that graduate must master carbon copies of the same capabilities. In fact it's important that education help students develop their personal strengths and develop individual goals.

Faculty teams would then use those programmatic goals first to devise strategies for observing and discussing the development of student capabilities as they progress toward graduation. Evidence of students' academic development is crucial for many reasons, not least of which is to help assure that students with varied preparation, needs and backgrounds all get a reasonable chance for true excellence.

With goals and assessment plans in hand, the next step for the planning team is brainstorm effective, efficient ways to achieve those goals. Time and money are always at a premium, so what sorts of targeted changes can accomplish the most progress with available resources? In some cases, the plan might involve small but pervasive changes in teaching methods such as signature assignments and efficient means of assessing them in large courses. In some cases the changes might be targeted, such as rethinking the role of the capstone course, engaging all faculty in the assessment of the seniors' work, and also redesigning gateway courses. Those are just two of many possible ways to redesign a course of study. One of the most ambitious examples we have seen of programmatic redesign was the development of approach to engineering education at MIT, a strategy that included renovating a building to give students a structured space in which they could work any time 24x7 on phases of their projects. (Crawley, 2007)

In redesigning a course of study, the team might pay special attention to strategies that can simultaneously improve graduation outcomes while also making the program immediately more attractive to potential students. For example:

- Emphasize work on authentic projects, including field work as well as other appealing high impact learning activities that can attract students while helping develop learning that lasts
- Take advantage of a program's size and/or its partnerships with other institutions to create specialized options that can increase student engagement, for example homework and assignment tracks for a physics course that offer a choice for potential majors in healthcare, engineering, biology and other fields.

It's unreasonable to expect a faculty to do all these things on its own, supported only by release time or grants. The faculty team will almost always need to work closely with appropriate specialists such as program developers from the teaching center, an assessment specialist, academic technology support, admissions or marketing (to spread the word about the revised program), the development office (to help raise funding for later stages of the work and to use the same of the redesign to help the university seek other kinds of gifts), facilities planning, and/or the office of online programs (if some or all of the offerings will be online).

Rethinking a course of study should be framed partly as teaching improvement and partly as faculty research, gathering and guided by evidence at each step. Institutions should also be prepared to demand and support a constructive, rigorous approach to gathering evidence to guide and ultimately to judge the reformed program. Some of the inquiry ought to span several such programmatic redesigns to see what barriers they face and what they have learned from trying to surmount them.

The goal is for faculty to create an evidence-based, widely valued, and sustainable improvement in graduation outcomes for a course of study. If they do, it should be a rewarding process in several ways. For example, the implementation of reform and, later, the visible improvement in graduation outcomes may well attract more and better students to the program, better placements for graduates, more philanthropic gifts, and an enhanced reputation for the program in its field.

However, by this point, readers may be doubting whether such an initiative could succeed at their own institutions. It is a reasonable doubt, and it is the reason why institutions should simultaneously strengthen the foundations needed for such large-scale, learning-centered reforms to thrive.

Strengthening Foundations for Learning-Centered Practices

When attempts to create, sustain and expand learning-centered practices have foundered in the past, it has been common to blame constraints that seem unalterable such as the faculty rewards system. Occasionally, however, authors have described institutional conditions and pointed out that, if altered or created to be an asset, they could enable learning-centered practices could flourish. Terry O'Banion (1999), for example, created an inventory of fourteen steps institutions should take to help institutions become learning-centered. He asserted that these steps included:

1. Revising mission statements
2. Involving all stakeholders
3. Selecting faculty and staff. Elaborating, O'Banion asserted, "For institutions committed to becoming more learning-centered, all new faculty, administrators, and support staff should be selected based on criteria reflecting the new emphasis on learning." (p. 5)
4. Training all faculty and staff about learning and how institutions can better support it.
5. Holding conversations about learning.
6. Identifying and agreeing upon learning outcomes
7. Assessing and documenting learning outcomes
8. Redefining faculty and staff roles. Institutions should drop formulae about teaching loads, class size, class schedule, and semester length and instead be more pragmatic about doing what it takes to support learning.
9. Providing more options
10. Creating opportunities for collaboration
11. Orienting students to new options and responsibilities.
12. Applying information technology to the support of a learning revolution
13. Reallocating resources

14. Creating a climate for learning

Owen and Demb's (2004) careful analysis of interviews with nine administrators at a large Midwestern community college revealed concerns with sources of problems, many unanticipated, that can slow or disrupt large-scale implementations of educational uses of technology:

- Turbulence: an environment where change is rapid and outcomes are unpredictable;
- Tension growing from strongly held opposing positions and producing volatility (for example, an institutional decision to invest heavily in technology but not in teaching improvement);
- Planning of infrastructure, disrupted by the unpredictability associated with implementing as an early adopter;
- Implementation processes exposing unanticipated issues, exacerbating tensions;
- Barriers such as role of faculty, pedagogical controversy, and intellectual property issues;
- Cultural change.

As discussed below, faculty beliefs about the nature and learning may encourage or discourage them from trying learning-centered practices. But, consistent with the research cited above, a study Henderson & Dancy (2007) suggests many faculty teach in a content-centric way, despite being open to learning-centered practice, because they see obstacles to teaching in that new way. Their intensive, carefully coded interviews with six tenured physics faculty from four different institutions (a small liberal arts college, two regional universities, and a major research university) revealed a number of situational factors discouraging faculty from using research-based methods of teaching:

- Student attitudes toward school and poor study skills
- Colleagues expectations of content coverage
- Lack of instructor time
- Departmental norms concerning the use of research-based methods of teaching
- Student resistance
- Class size and room layout
- The fixed time structure of the semester making it difficult to adapt to differences among students

The USM inquiry led us to formulate a list of conditions that each often hindered the spread of course redesign but that each can potentially be transformed into foundations for large-scale learning-centered changes in teaching and learning:

1. Leadership that continually reinforces the importance of a few core ideas (such as the importance of rethinking teaching-learning activities including the ways they use scarce resources such as faculty time) and foster their creative implementation.
2. Developing a track record of collaboration across boundaries in order to improve learning.
3. Foster continuing discussion of those beliefs about teaching and learning that might either support or discourage efforts to improve learning outcomes.

4. Assuring that more faculty become comfortable with important elements of learning centered practices such as efficient ways to assess and provide feedback on students' ability to apply what they are being taught.
5. Developing appropriate infrastructure (e.g., flexible classrooms; strong programmatic organizations) and support services (e.g., a strong teaching center; technology support that helps assure that multiple technology-based resources work together seamlessly for students and faculty).
6. Services that help faculty, students and staff see what students are learning and how they are learning as they progress through their courses of study, helping guide each students learning and also helping faculty and staff figure out how to improve teaching strategies and resources.
7. Faculty personnel policies and practices that can encourage faculty to improve student learning over the years.

1. Energetic, consistent, persistent leadership

One of the most frequent comments in interviews with faculty involved in redesign was the importance of visible, active support from the top.

We suggest that, to foster more widespread and large-scale rethinking of teaching and programs, chancellors, presidents, and deans should continually reinforce four crucial ideas in their institutions and academic units:

- The feasibility and the importance of improving graduation outcomes, especially outcomes for students from underserved economic and ethnic backgrounds;
- The necessity of using learning-centered practice on a large-scale to do so, starting with 'backward design' from authentic graduation goals,
- The necessity of recognizing that to make significant and continuing improvements in graduation outcomes, it is inadequate to tack glamorous innovations onto an otherwise unchanged program or course. Instead faculty need to take a fresh look at what students do, what the faculty do to help them, and how both institutional and student resources are used to carry out those activities.
- The necessity of taking the long view rather than expecting a great leap forward in outcomes: working by way of a series of cumulative steps, a few big, many small. (We will return later to why it's crucial to take the long view.)

These ideas should be applied within the institution, for example in hiring and working with institutional leadership or communicating with faculty across the institution. Leaders should also share these same ideas as part of their strategies to develop and sustain support from alumni, employers, state government, taxpayers, and other external stakeholders. Leaders at four-year institutions should also use ideas like these in their work with the two-year institutions and high schools in their state. Innovations inside an institution cannot succeed without appropriate support from outside.

No single message or act can create the widespread buy-in needed to sustain the work of improving graduation outcomes. At USM, elements of these four ideas have already influenced action, including

the Regent's Effectiveness and Efficiency initiatives, the investment in course redesign initiatives, Chancellor Kirwan's continual messaging about the system's national leadership in academic transformation, setting a performance goal of academic transformation, and the monthly discussion by system provosts of issues related to transformation.

For academic transformation leadership to be seen as committed to change, faculty and staff need to know that discretionary funds are being invested each year, selectively, for release time, summer salaries and other transition expenses of shifting from old formats to new. The goal for these mini-grants should be to assure (and document) cumulative progress toward improved outcomes. Traditional universities, especially university budgets, have treated change in teaching as an exception to the rule; almost the entire budget is allocated to individual units who energetically defend them and try to enlarge them. In contrast, to make support continual change toward graduation outcomes – a pattern of change that involves cross-silo collaboration and shifting priorities over time, more of the budget needs to remain flexible, invested in one-time and short-term uses rather than being allocated as base budget to individual units. This flexibility may also make it easier for programs to create new constellations of faculty time and materials rather than simply treating proposals to buy specialized online services as an added expense that isn't in the budget. Course redesigns in USM and elsewhere have already demonstrated a few ways in which these new constellations can be more effective ways of using available resources.

Perhaps the best way to gauge the success leadership around those four principles is to wait and see whether, as one leader departs, stakeholders take for granted that the new person must continue to apply those same ideas.

2. A culture of working successfully across silos

USM's experiences with course redesign initiatives suggest that "it takes a village." Many of the course redesigns were able to succeed because of constructive, continuing work with technology support and with vendors supplying evolving academic services and materials. Some course teams were energetically supported by department chairs who helped assure that appropriate faculty joined the team and that the redesigned courses were scheduled in appropriate facilities at appropriate times. The Provost's Offices typically played an important role in securing resources needed for the redesign, including renovated classrooms. In at least one instance in USM, a redesigned course in one field was able to teach a sizeable number of course sections in the building of another department.

Work across silos rarely comes naturally in institutions of higher education, which attract their share of people who value control and autonomy and who may have a history of bitter struggle with one another over the too-scarce resources of the system and rancor at offices such as academic technology or the provost for past failures. At some institutions, this situation has become so poisonous that many faculty and administrators interpret any proposal from the 'other side' in the light of the evil motives that they assume underlie every proposal and suggestion; it would be difficult to mount a large-scale effort to improve graduation outcomes until after those enmities cool. A subtler barrier to collaboration is raised when potential collaborators as yet have no sense of where they can trust others to hold up their end of the work.

Before a course of study can be reformed, it helps if at least some of the potential participants have gained some successful experience in relying upon each other. That sort of trust is one of the strong foundations needed for programmatic reform to succeed. Many of the recommendations in this report can only be implemented collaboratively; each time one of those implementations works well, participants will also be better prepared for such collaborations in the future.

3. Debating beliefs about the nature of teaching and learning

One might imagine that an institution of higher learning would be a hotbed of continual debate about what and how to teach and, partly as a consequence, what and how students learn. One might imagine that faculty would take care to engage students in those discussions as well since students' choices as well as faculty's influence learning outcomes. However, not all universities and colleges feature such discussions, perhaps because the very idea of having such a discussions on what assumptions faculty make about learning and teaching.

As the phrase "delivering instruction" suggests, many faculty see teaching as a process of selecting and explaining content. In a classic cartoon, two boys are seated on a curb with a dog. One boy remarks that he has taught the dog to whistle. When the other boy demands a performance, the first boy retorts, "I said I taught him. I didn't say he learned it." For content-centered faculty who believe student abilities are fixed (Dweck 1986), teaching is like a sieve, informing the talented students while sifting out others who should be thinking about other pathways. Because they see teaching as a straightforward task of laying out important ideas and techniques, these faculty may see little or no reason for debates about teaching, teaching centers, course redesign, or initiatives to rethink courses of study. Such faculty might also interpret improved DFW rates or assessments of learning as evidence that standards are being lowered. It is difficult to assemble enough faculty to rethink a course of study if too many of them think the goal is a delusion and a sham.

Academic leaders in the administration and faculty need to figure out ways to increase the number of faculty who are willing to give learning-centered teaching a chance.

One of many possible tactics is for a group of faculty to take an anonymous self-assessment about their views about teaching, learning, and ways in which the institution is (and isn't) supportive of their preferred ways of teaching. A draft example of such a survey called FacultyViews, created by the Kirwan Center, can be found at http://bit.ly/facultyviews.

FacultyViews includes items that are intended to reveal what faculty think about:

- Whether student abilities are fixed or malleable
- Whether to teach for a single, modal kind of student or to engage students with a variety of assumptions, preparation, needs, and backgrounds
- Whether to organize courses around content or around capabilities to be developed in the context of content
- Whether good teaching is best left as the responsibility of individual, autonomous faculty or whether faculty should spend significant time working collaboratively and exercising the responsibility collectively

- Whether they would expect their colleagues to be supportive, indifferent, or skeptical if the faculty member were to try experimenting with new ways of teaching that didn't work the first time out.
- Whether, in the context of trying to make a course both more challenging and more effective they see student course evaluations as a threat and/or a source of guidance
- Whether various elements of institutional infrastructure and services enable or impede them from teaching as they would prefer
- Whether they see academic leaders such as the Provost and Dean as placing great or little priority on teaching improvement.

Faculty and administrators ought to be willing to have a reasoned debate about whether a track record of using evidence to improve teaching should a criterion for being hired as a professor or being tenured.

4. Sharing experience with elements of learning-centered practice

USM's course redesign initiatives succeeded in attracting proposals from perhaps a tenth of the faculty teaching multi-section undergraduate courses with a history of high DFW rates. One of many factors making faculty teaching the other 90% reluctant to step forward was a concern that redesigning a course might be too time-consuming and risky. Their uncertainty probably resulted in part from a lack of prior experience:

- With relying on technology for teaching;
- With creating, facilitating and grading active or collaborative forms of classroom learning;
- With defining learning goals clear enough to be used to develop assessment strategies and learning activities ("backward design");
- With using evidence to make choices about teaching.

"Learn to walk before learning to run." Institutions should find ways to engage a large fraction of their faculty in using low risk, high reward, learning-centered practices. For example, in one strategy, students are given small cards or the like so that they can summarize anonymously something important or useful they've learned and something else about that seemed important but about which they are still not clear ("muddy points") Another strategy to spread is using the think-pair-share approach instead of asking a question to the whole class and waiting for volunteers. Both of these practices almost always provide useful insights to faculty. They are easy to grasp and have little risk of failure or embarrassment. (Angelo and Cross, 1988) Experience using practices such as these to make easy, effective improvements in teaching could make more faculty comfortable enough to try more ambitious changes in their teaching.

Getting the word out and enticing large numbers of faculty to try such techniques at least once is itself an R&D challenge. For example, are there multiple ways of publicizing a technique such as think-pair-share, each of which is likely to catch the notice of a different set of faculty? What features of a teaching idea and context influence whether that idea spreads virally, from one user to several colleagues? The Provost might charge a working group of faculty and staff to identify a few such

powerful techniques, to outline complementary strategies for engaging faculty, and to outline how the results of such work might be evaluated for possible internal use and external publication.

5. Strengthening infrastructure and support services

USM course redesign teams frequently had to cope with challenges of infrastructure and support services. Three areas stood out in interviews: getting prepared learning assistants, getting appropriate learning spaces and schedules, and getting assistance so that a variety of periodically changing course technologies would continue to work seamlessly together. To ramp up to rethinking courses of study, some additional improvements in infrastructure and services would also be useful.

A well-staffed and budgeted center to catalyze teaching improvement: Many institutions with teaching centers merely envision them as helping a few "bad teachers" through consultation and offering some (probably little-attended) workshops. With these low expectations come low budgets. A more substantial center is needed, however, if institutions are hoping to support the rethinking of several courses of study every few years. To rethink a course of study, faculty need someone to help with background research, program design assistance, and help in gathering and maintaining a broader network of support, ranging from librarians to specialists in fund-raising. A healthy teaching & learning center might supply one or more such specialists. More importantly, the Center should provide professional staff support for the whole coalition, helping assemble it and assuring that the various bits of work are done and flow together in a timely way. Such a center would become a force multiplier, enabling other faculty and staff to accomplish far more than they could have, unaided. Many USM institutions are currently strengthening their teaching centers and faculty development programs (see Attachment C for a few examples).

For public systems of higher education, the system office might convene teaching centers in the institutions. USM's Council for Program and Faculty Development (described in Part I) is just one model for how this might be done.

Preparing undergraduates to be learning assistants: In "Shifts Toward Learning-Centered Teaching in the Redesigned Courses" in Part I, we described how potent the use of undergraduate learning assistants had been in lowering DFW rates in redesigned courses, especially when the learning assistants were taught how to coach and facilitate in a learning-centered way. This subset (about a third of all courses that responded) lowered DFW rates by 10 percentage points while the one-third of courses that did not use ULAs lowered DFW rates by only 2 points. Faculty found it far easier to use learning assistants if they could be enrolled in a course that would teach them these skills. The use of prepared undergraduate learning assistants might well spread more quickly if every institution had the capacity to train and support a growing number of courses using them. To gain further leverage, within a system or consortium institutions might divide the work, with several institutions providing different, specialized forms of training to the whole group of institutions. Using hybrid or online courses might help enlarge the number of cross-registrants. One ULA course might specialize in preparing students to be assistants in STEM courses while others focused on courses other fields such as the arts, business, or nursing.

Good technology support is usually needed courses and courses of study become more learning-centered, even though using technology is not part how they are defined.. But there are several reasons for such courses to depend more on technology than does content-centered instruction. For example:

- Students learn by what they do, and in most fields technology offers some important opportunities to expand what students can do because that professionals in the field now rely on some technology-enabled ways of thinking and acting;
- In more learning-centered courses, interaction among students and with faculty is almost always ramped up. Digital technologies offer a choice of pace, media and structure for such collaboration while enabling the interaction to occur over great distances and multiple time zones. Email and threaded conferencing makes it easier for students and instructors with different native languages to converse thoughtfully about the course.
- Digital technologies are essential for many strategies to educate students with contrasting backgrounds, needs, and motivations. For example, by relying more on student use of online materials and communications outside the class, it becomes more practical for faculty to manage different groups of students who are studying different things, or studying the same thing in different ways, in the same week.

Offering good technology support is challenging for at least two reasons. First, at most institutions, many (most?) faculty are not yet comfortable using technology to alter their teaching strategies. They may use an online grade book, post a syllabus and perhaps even put readings online, but none of that involves rethinking the course. To help faculty get comfortable enough with a technology that they can use it to alter their teaching requires a sophisticated strategy and helpers who are as experienced in teaching as they are in using technology. Second, redesigned courses, and courses of study, may need several different systems and resources, each from a different source, to work together smoothly. Each time one of those course components is upgraded by the vendor or swapped for a substitute by faculty, the constellation of components may stop working smoothly together. For example, the older version of a tutorial may automatically feed data into the grade book in the learning management system, but upgrades to either the tutorial or the grade book may break that link. To help faculty keep the constellation working, support staff need a sophisticated mix of skills, including a little subject matter insight. Given the difficulty of the challenge, it may take some time to strengthen this foundation sufficiently to support faculty across the institution. This is also another reason why it makes sense for universities to begin rethinking 1-3 courses of study that are best positioned to succeed; these initial demands on the system should also be helping to strengthen foundations that can help learning-centered practices to spread further.

Departments that are capable of "owning" redesigned courses or courses of study: For a course of study to become more effective, it's crucial that faculty exercise collective responsibility for the program, rather than allocating all that responsibility, bit by bit, to faculty who each make autonomous decisions about a small piece of the program without regard to how the rest of the program may be evolving.

At many institutions the culture, organization and budgeting of departments does not currently encourage collective faculty initiative or responsibility. Their faculty may believe that exercise of

collective faculty responsibility violates the academic freedom of the individual faculty.[13] Departments may have little or no discretionary money for summer stipends or release time to support bigger steps in improving a course of study. Their chairs may be elective and rotate every few years. In many departments there is little expectation that chairs will play an academic leadership role in curricular improvement. Nor may the chairs have learned much from the experience of other departments in curricular reform or in how to use learner analytics and other tools to monitor how well the course of study is doing for its students.

The organization, budgeting and culture supporting collective faculty responsibility for courses of study probably will only develop through many small steps. For example, institutions and systems ought to provide more education for chairs about how programmatic reform can work or misfire, about how to help their colleagues try new teaching approaches, and about how to use institutional data to see how well the course of study is doing.

Flexible learning spaces and appropriate scheduling practices are another area where institutional leaders need to put their heads together. A flexible learning space is one that, at minimum, makes it easy for students to change their working arrangement multiple times during a class meeting; students can shift, for example, from a lecture arrangement to five person groups working at a table on a project, then to working alone, and then back to a lecture format. Such spaces often also need to support student work with computers, whether in place or "bring your own device."

Such flexibility requires not only appropriate facilities in the room but also low enough seating density. A space that can pack 50 students into lecture seating might only have the capacity for 30 students to work flexibly. Scheduling arrangements are important too when on-campus classroom meeting hours are reduced in order to move some of the interaction online or off-campus.

In planning investments to create more flexible space, it's important to relate the investment to programmatic change that it would make possible. The biggest returns on investments in space come from enabling a change in a course of study and its outcomes. It may make more sense, for example, to renovate three classrooms to a modest level of flexibility than to use the same money to create one more glamorous learning space.

Integration of, or close collaboration among, the teaching center & learning center, academic technology support, and online learning: In many institutions these units operate independently of each other, dividing their work to decrease redundancy:

- The academic technology may concentrate on providing reliable tools and services and helps faculty and students learn which buttons to press to use the technologies of the day;
- Online learning may strive to create extra revenue that the institution can use to balance its budget;

[13] This problem came up often in USM's course redesigns. But this claim that academic freedom allows individual faculty to make all decisions about a course's content, goals, assessment and conduct goes far beyond the definition of academic freedom defended by the American Association of University Professors.

- The teaching center may workshops and consultations to help novice instructors, teaching assistants, and faculty who need assistance with teaching problems on campus. In the process it may ignore how using technology can alter learning because (a) that is seen as the responsibility of the academic technology unit and (b) it may lack the funding for staff with that expertise.

Improving graduation outcomes requires far more shared planning and effort than this fragmented scheme allows. Here are just a few reasons why closer integration of effort is essential.

First, appropriate use of technology can aid many of the reforms needed to improve graduation outcomes (e.g., signature projects; more engagement with other cultures; hybrid courses that help students with jobs reduce their commuting time; development of strong academic community).

Second, the institution can gain more value from the staff. When these units operate independently, they may have overlaps in staff expertise. Online learning may hire instructional designers who see their work totally in terms of cranking out online courses, while the teaching center may have (or need) instructional designers who work with faculty on campus courses. All the units may need staff to help them reach faculty (e.g., through intelligently designed web materials) but none may have the budget to hire such staff. Academic technology may need staff that understand both technology and also what it's involved in teaching a university courses, but be able to hire and retain only staff who know technology. Integrating these units or supporting very close collaboration among them (including hiring) can help assemble a staff team flexible enough to apply their skills in a variety of venues (campus courses, online) and in a variety of ways (e.g., one-on-one support; workshop leadership; creation of web tutorials).

Third, the potential of online programs to generate income for the institution suggests the possibility of creating new online programs (graduate, undergraduate, certificate) that are designed to support superlative teaching, e.g., developing strong academic community, engaging distant experts in helping teaching, putting students into field placements far from the university that are most appropriate for their studies). These program features and, later, evidence of the value gained by graduates, could help attract more students and generate surpluses that could be reinvested in further improvements in online programs. The impact of this cycle can spread beyond the online programs themselves. Research suggests that, when faculty try new teaching approaches in online courses, they often then use the same approaches on campus. (Ehrmann, 2014)

6. Providing and using evidence needed to guide learning, teaching and advising

Learning-centered teaching is defined by its use of information about actual learning. Programmatic improvement needs to be guided and encouraged by information about programmatic performance But in many institutions, several essential feedback channels are dangerously weak.

Feedback within courses about student research, projects, papers, and other unscripted work. Faculty are sometimes reluctant to assign such projects because of the time they think is required to assess them and give students detailed feedback, especially when the faculty member is teaching a heavy load and large sections. Institutions should help propagate *timesaving, effective ways to assess student's ability to work on unscripted problems and then to provide appropriate feedback and coaching to help students improve their abilities*. There are many such techniques that are easy-to-grasp, low risk to try,

and highly likely to succeed. The institution's writing program may be a source of ideas for how faculty can assess student papers and provide compelling feedback, effectively and efficiently. These may suggest strategies for providing better feedback and motivation when students in a large course are assigned other sorts of projects, from web sites to patient treatment plans to sculptures. The intent of such improvements is to help faculty feel more comfortable in assigning more such projects and more confident that students will pay attention to the feedback rather ignoring it. Project-based learning is a powerful way to create learning that lasts.

The second weakness may lie in *faculty and students being unable to see patterns of learning developing outside the box of the course*. Are students making good progress in development of essential learning outcomes? Are some skills being retaught (and then forgotten) in course after course? Some courses of study use techniques such as capstone courses and senior theses to assess how well earlier courses have done in developing students. These become more effective when student projects are assessed by faculty teaching earlier courses who then analyze the results together: where has student preparation been strong? Where is improvement in teaching needed?

It's likely that faculty will concluded that they and students need more such feedback earlier in the program. Day-one assessments of student readiness for each course can help, assessing whether students enter the course with the desired capabilities. Also potentially helpful in getting a programmatic view of student progress:

- A series of projects, threaded through courses, that require and assess whether the students' capabilities are developing
- ePortfolios requiring students to periodically use evidence from courses and from other elements of their experience to document their academic development;
- Learning analytics findings about students' patterns of study online and student persistence; and
- Surveys of students about how they see their unfolding course of study.
- Feedback from students' placements after graduation to the faculty engaged in their course of study about ways in which students were well- or ill-prepared.

Third, institutions should work to improve the *quality and usefulness of student feedback to faculty and administration*. USM faculty frequently mentioned their concern that teaching a redesigned course might lead to a threatening decline in student ratings (because the new course was more challenging than the old), even if learning outcomes improved. Their worry stems both from the summative, quantitative nature of such forms (on a scale of 1-7, how good was the teacher) and also from the thoughtless way such scores are sometimes used to make decisions about promotion or tenure. At minimum, institutions need to allow for differences in rating due to instructional improvement or class size. Better yet, it's also important to have questions that each provide actionable feedback for improving courses; gathering student feedback is a research activity and it ought to exemplify to students what good social science research should look like.

Fourth, *in order to make better use of available resources, faculty will need help in modeling the program's use of time, money, and space.* Quite a lot can be done with a simple spreadsheet and a little

time. Geith and Cometa (1999) demonstrated that faculty's first impressions about how much time they spend in teaching may be quite mistaken. When several people are involved in teaching and supporting a course of study, none of them may understand how much of their time is devoted to this and therefore they will have little idea of whether changes in the program might result in better uses of their time. A little reflection and a spreadsheet can be of great assistance. For example, in a project to redesign all the University of Pennsylvania's undergraduate engineering laboratories to be more effective and efficient, simple interviews were used to break down how faculty and grad students spent time running the many undergraduate engineering laboratories. Interviewees were asked to separate their time uses that were fulfilling from use of their time that were only a means to an end, such as time spent training students to use the equipment in the lab. The initiative improved lab effectiveness , increasing time faculty could spend coaching students on their research, while cutting costs in several ways (Powell et. al., 2002).

7. Rethinking faculty personnel practices and policies

The final foundation for widespread use of learning-centered practice is appropriate faculty personnel practices and policies.

Many USM faculty were concerned that course redesign work might harm their careers. Institutions ought to take a fresh look at the kinds of *information required in faculty dossiers for promotion and tenure decisions.* We suggest that, for teaching to remain vital, it must be periodically reexamined. Perhaps faculty dossiers and teaching portfolios should provide an unfolding record of reflections, use of the literature and insights from others, hypotheses, and experiments. As such, they might be subjected to external peer review and feedback. Boyer (1990) provided interesting arguments about why, even at research institutions, the character of scholarship needs to be reconsidered.

Second, the measurement of *teaching load* was also frequently mentioned by USM faculty as a constraint on innovation. The redesigned courses were often multi-section and it was essential for one faculty member to invest extra time to coordinate the continuing evolution of the course across sections. Such a responsibility is not always counted toward the coordinator's teaching load, which implicitly discourages faculty from stepping forward to do that important work. Another question about how to count teaching load relates to the way that many redesigned courses coupled improved course activities and resources with larger sections (freeing faculty resources to help 'pay' for those improvements). In some institutions, the calculation of teaching load discouraged faculty from taking steps to enlarge sections. For example, if a normal section was 25 students and a faculty member had been teaching two such sections, she would probably have gotten teaching load credit for two courses. But if the redesign enabled her to teach those same 50 students effectively in one section, she might then be required to teach an additional course if the local formula used "course" as a unit of effort. Local teaching load definitions sometimes also discouraged faculty for making fractional contributions to a course, e.g., delivering a series of guest lectures, engaging in team teaching, or helping to assess student projects or papers. In the previous section, we suggested the value of engaging many faculty in assessing and providing feedback on student capstone projects and theses; it's important to consider whether those faculty would get any teaching load credit for their contributions.

Third, USM faculty also mentioned that their departments or schools lacked a budget line item to pay selected faculty for doing summer work to make major improvements in courses. For continual adaption of courses to become a normal activity, *some budget funds will need to be allocated to selectively support faculty work in the summer on course improvement*.

Next, many faculty commented on how the system of paying adjuncts discouraged them from spending extra time to keep up with the changing materials and methods of an evolving course. For example, if faculty needed to go off-campus to be trained in a new technology being used in the course, this would be seen as a requirement or request outside the adjunct's contractual responsibility.

A final personnel issue is crucial for improving courses of study, even though it didn't come up in our study of USM course redesign: to encourage faculty to work together, it helps if personnel (and other budget-related) decisions are influenced at least a little by the performance and potential of their course of study. This is no simple task, as research universities know from trying to assess research projects with large numbers of co-authors. But without attention to the results of collaborative work, faculty may feel compelled to devote their individual efforts only to activities that are their sole responsibility.

Making it Happen: The Importance of Taking the Long View

Repeatedly this report has argued for the importance of working with available resources while also suggesting many activities that obviously require getting more money and time. That may sound like a contradiction. It's common to feel strapped in the academy, with no extra money and no time to even think about how things might be done differently. Those feelings are based partly in reality and partly in an illusion.

There is no time: First, idealistic and energetic people will always fill their time with important work. Once those commitments are made, it's difficult to make a major, swift change. "Work expands to fill the time available" is sometimes referred to as Parkinson's Law (Parkinson, 1958). That's a major reason why people resist dramatic suggestions for changing how they work. People can easily also come to believe that, to achieve a certain result, a certain amount of time is essential, just as a recipe may require a certain number of eggs and a particular quantity of flour. That analogy may be quite misleading, however. A pilot study by Geith and Cometa (1999) took a look at how eight faculty members, chosen from across colleges within the Rochester Institute of Technology, spent their time teaching a course on campus and a similar course at a distance. Each faculty member was selected for extensive experience in both modes. The researchers found that each faculty member spent roughly the same amount of time per student, no matter what mode of teaching was used. But, among those faculty, their time spent per student varied by a factor of three for the on-campus courses and by a factor of seven for the distance learning courses. In that situation, at least, there does not seem to be a recipe requiring that, to teach a certain number of students, it takes a certain amount of time. The evidence instead suggests that faculty come to believe that it is right and possible to spend a certain amount of time per student, and then they fill that time as best they can. They probably adjust the course itself so that the workload will fit their standards. For example, in our travels outside Maryland, we encountered a major research institution where some faculty teaching composition did not assign students to write even a single paper because the faculty felt they didn't have time to grade them.

There is no money: A parallel phenomenon has been discovered in university budgets. Many people assume that the "recipe" metaphor describes budgets, too: to run a degree program of this quality, one must pay a certain amount of money for faculty, facilities, and so on. If you don't have that much money, you can't run the program, at least not to that standard. If some other institution has more money than that for its program, they must be squandering some of that because it's more than what is necessary. Here too this recipe notion resources and results is misleading. Howard Bowen (1980) helped establish that there is no universal formula for how much spending, or what kind of spending, is needed to achieve certain academic results. Bowen's research demonstrated institutions with very similar profiles and reputations spend quite different amounts of money per student, and spend each dollar in quite different ways. His revenue theory of costs (sometimes called Bowen's Law) asserts that universities raise all the money they can, spend all the money they get, and spend it this year in ways mostly determined by how they spent it last year." That final clause ("in ways mostly determined by how they spent it last year") results from the fact that budgets tend to be tied down into personnel and other slow-to-change expenses, and to be defended by persuasive people who see disaster if their budgets are cut.

This rigidity in how time and money are spent is probably fatal for any initiative hoping to make dramatic improvements in graduation outcomes in just a few years. Even if injections of outside time and money are received, the bulk of spending and uses of time are constrained to go on as before.

The good news: because there is no fixed relationship between inputs of time and money and educational results*, it should be possible to make improvements by changing methods so long as the evolution occurs slowly enough*. If a decision is made that a certain activity must be done for half the money by the end of three years, it's more likely to happen than if the change must be made in a month. If faculty decide that they need to spend half the time on certain teaching activities while improving effectiveness, they're more likely to find new methods and just over a period of years than over a period of months. That's what we mean by "taking the long view."

Summary

In order to improve graduation outcomes, institutions ought to encourage the use of learning-centered teaching to develop stronger courses of study. That can be done systematically but only if the foundations for learning-centered practice are strengthened:

1. Exercise energetic, persistent, and consistent leadership around improving graduation outcomes, learning-centered practices as a means to that, and the need for creative reallocation of scarce resources as an integral part of rethinking teaching;
2. Encourage cross-silo coalitions to work on problems and opportunities outside the reach of single units or individuals and, in the process, develop trust and skills of dealing with conflict;
3. Encourage discussion and debate of beliefs about whether changes in teaching can enable development of surprising ability and achievement among students;
4. Encourage far more faculty to try and become comfortable with elements of learning-centered practice;

5. Strengthen institutional infrastructure and services that are important for support of learning-centered practices;
6. Provide data and services needed to guide the use and improvement of learning-centered practices;
7. Rethink faculty personnel policies and practices that potentially encourage or discourage ambitious uses of learning-centered practice, including decisions on promotion and tenure, calculation of faculty workload, and the scope of contracts with adjunct faculty.

These stronger foundations will enable and encourage more faculty to undertake incremental, cumulative improvements in teaching. That's valuable in itself and also helps advance the improvement of courses of study.

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Attachments

Attachment A. Definitions Of Common Terms As They Are Used In This Report

Academic transformation: Across USM, this label was used to characterize a variety of changes and to emphasize their potential importance. More often than not, the term was used to indicate that a process relating to teaching and learning was being redesigned. Somewhat less frequently, academic transformation was used to suggest that part of the rethinking was to make better use of available resources.

Academic work, rethinking of: improving learning through activities (faculty, student, staff) that make more effective, efficient use of available time, money, and facilities.

Assessment here refers to any intentional effort to analyze student capabilities or achievements, individually or collectively.

Backward design got its name because it reverses the way that many faculty organize courses and courses of study by asking what content should be covered. Instead the process begins by describing the kinds of capabilities students should have developed and what they should have accomplished by the time they complete their program. Next ways of making student development visible are selected or created. Then the learning activities are developed. (Wiggins and McTighe, 2005)

Chancellor is the term used in this report for the leader of any state system of higher education.

A *content-centered approach* organizes courses by considering what needs to be presented and explained to all students. Faculty members using this approach sometimes also believe that student learning of this content is determined almost solely by student talent and pre-college preparation and not at all by the strategies used to teach it.

Cost-saving was a label integral to the National Center for Academic Transformation's (NCAT) model of course redesign, measured by placing a monetary value on the instructional time needed to teach a course and dividing that by the number of students. NCAT explained that this "cost-saving" would free faculty time for other uses.

A *course of study* can be any set of courses, activities and services that have an intentional, cumulative impact on students' academic development. A degree program, a minor, a program to systematically develop students' citizenship and leadership through their co-curricular activities, and a quantitative reasoning across the curriculum program are all courses of study.

Course redesign is a process that requires taking a fresh look at all the activities and materials used in a course, with the intention of improving learning outcomes while reducing demands on faculty resources needed to teach these (usually) large enrollment courses.

Cross-silo collaboration involves teamwork among people and units that traditionally have not worked well, or at all, with each other. Within an institution this might include units that normally ignore one another except when competing for budgets, or work that involves both staff and faculty on an issue such as how to improve academic performance of transfer students. Silos normally separate faculty and

staff in different institutions especially if they do not identify with the system but only with their institutions or their disciplines.

DFW rate is the percentage of students registering for a course who later withdraw, or get D's or F's. In this report, we compare pre and post-DFW rates in terms of percentage points. If a DFW rate was once 20% but is now 13%, the report describes this as a 7-point decrease in DFW rates.

Evidence is used more or less interchangeably with terms such as observations and assessment results. Empirical studies such as those by Schneider et. al. (1981) and Bain (2004) found that faculty widely regarded as superlative college teachers also tend to guide their work through close observation of how students are learning, or failing to learn; using those insights they decide how to adjust in order to give all students in their courses a better opportunity to learn.

Graduation outcomes of a program are (a) who is able to complete a course of study and (b) their achievements and capabilities by the time they complete that program. When this report refers to "improving graduation outcomes," the phrase is always accompanied by an explicit or implicit "through creative stewardship of available time, money and facilities: both the institution's and the student's."

Instructor and *faculty member* are used interchangeably to denote the people responsible for teaching students; in context either term might implicitly include graduate teaching assistants as well.

Learning in this report is often used as a synonym for learning outcome: what students have actually gained from an academic experience. *Learning* may also be used to denote the student activities that produced those outcomes. *Learning* and *learning outcomes* are not used as synonyms for teaching goals. What a student actually learns is generally somewhat different from the intentions of the instructor, textbook author or materials developer.

Learning-centered teaching practices are those that are chosen, refined, and judged by what all the students are actually learning – the results of teaching. Faculty using this approach believe that changes in course activities can alter learning for some or all students, though different students may be influenced differently.

NCAT is the National Center for Academic Transformation. NCAT had developed a vision of course redesign, tested it, and later helped USM launch the Maryland Course Redesign Initiative (MCRI).

President is the term used in this report for any leader of an individual university or college.

Provost is the term used in this report to designate an institution's chief academic officer.

Redesigning and *rethinking* refer to the use of backward design (q.v.). The terms suggest that change is planned by taking a fresh look at how things are done and perhaps at how resources are used to do them. If a change does not involve rethinking, then it usually simply adds an activity (and a use of resources) to a process that otherwise stays the same. For example, a few decades ago, students in composition courses used pens or typewriters. When word processing first became available, it was most often used to do final formatting and printing in a course that was otherwise unchanged. As the years went by, faculty began to change the character of composition courses to take advantage of the fact that rewriting (and rethinking) an argument was now mechanically so much easier.

Teaching includes all intentional activities aimed at helping students learn, not just the activities of faculty explaining ideas.

Undergraduate learning assistants (ULAs) -- undergraduates who previously had taken the course and were brought back to facilitate small group work, coach individual students, help with technology in the classroom and/or to help faculty with assessment.

USM is the University System of Maryland.

Attachment B. Indirect Benefits of Course Redesign for USM Institutions

What is most striking about the current work across the System on academic transformation is its variety. Here are just a few examples, listing the institutions alphabetically.

- To add to the one course redesigned using FY14 enhancement funds, **Bowie State University** uses a portion of its Title III funding to encourage its faculty to develop more courses using NCAT models. While the proposals are generally single section courses, it is expected that the approach will be utilized in multiple sections after the pilot. There's been competition for this summer program; 10-14 faculty proposals have been supported each of the past three summers (2013-2015).

- **Coppin State University** is redesigning a number of courses, aided by funds from the Maryland Higher Education Commission (MHEC). But Coppin's experience with course redesign also helped convince senior leaders that it was possible and important to think about the design of entire academic programs, shifting to a competence-based format. Coppin's team was recently selected as one of ten, nationwide, who will take part in the Gates-funded EDUCAUSE NGLC Breakthrough Models Incubator. Coppin's work on programmatic redesign might turn out to be an important model for other institutions in the System.

- **Frostburg State University** has created the Summer Online Freshman Initiative (SOFI) program. SOFI allows incoming freshmen to take one introductory General Education Program or developmental math course online in the summer before arriving on campus for the start of their first semester in the fall. The online courses offered through the SOFI program are carefully designed for first-time online learners and include substantial interaction between faculty and students.

- **Salisbury University** continues to offer one of the more unusual and effective redesigned courses. PHEC 106 has been a required general education course, offered in dozens of sections each year. Each section had been organized around a single physical activity such as swimming or jogging, and also included classroom sessions about the academic side of health and wellness. The redesign of PHEC 106 was occasioned by its extensive need for classrooms and athletic facilities; ironically PHEC 106 was motivating its students to exercise and then filling up the facilities that its former students might have otherwise used to get that exercise.
  Today many sections get all their instruction online, while others combine some classroom work and some online activity. While some sections are still devoted to a single athletic activity, others allow students to exercise in any way they choose. Using a university-supplied pulse monitor students must keep their heart rates in an elevated zone for 40 minutes. Demands for space have been cut sharply by several design changes:

    a. Lecture sessions were reduced from three half-hour session per week to one 50-minute session (so three sections could be scheduled for the same room by meeting on different days of the week).

    b. Section sizes in face-to-face sections were increased from 30 to around 80.

c. The redesign now has 60% of its sections of fully online.

Reducing PHEC's annual requirements for classrooms by 93% while also reducing the number of instructors required has enabled the department to schedule nine additional three-credit hour courses for its majors.

- **Towson University** has created the Office of Academic Innovation in part as a result of the System Office's leadership on academic transformation. OAI has been running a program called "Course Redesign Towson Style," which departs from several elements of the NCAT paradigm (no emphasis on cost-savings; no focus on multi-section courses). OAI dropped cost-savings as a criterion for its solicitation because it was anticipated difficulties attracting faculty proposals. However, OAI is concerned about costs born by students so it has attracted enough faculty to make Towson the biggest participant in the Maryland Open Source Textbook initiative.
- The **University of Baltimore** has started its own Office of Academic Innovation, which includes the Bank of America Center for Excellence in Learning, Teaching and Technology. For several years, the Center has been convening teams (cohorts) of faculty who all learn about and work on the same kind of teaching improvement (improving assessment or incorporating more education for entrepreneurs into their courses, for example). Supported by the Center's endowment, cohort members work continually on their issue and, every few weeks, convene to share their new insights and experiences. Each member is expected to develop and test out new strategies aimed at increasing student learning and success, to document their work over time, and to produce a tangible teaching and learning tool or artifact as a result of participation.
- The **University of Maryland Baltimore** has leveraged its enhancement funds to help develop 17 courses. For some time UMB's Graduate School has been using evaluation criteria from Quality Matters (a spinoff from Maryland Online) to assess online courses. That reliance on QM ideas was increased through UMB's participation in the initiatives. Now those quality criteria are being used to help develop proposals to put entire degree programs online, to judge which proposals to support, to help guide the resulting development work, and even to design the student feedback forms. For example, interaction with the instructor and other students is one of the quality criteria from QM so the student feedback form asks for their judgment about whether such interaction was encouraged.
- At the **University of Maryland Baltimore County**, the Departments of Biological Sciences and Mathematics and Statistics have redesigned courses based on the pedagogical model known as Team-Based Learning (TBL). TBL is a specifically structured format that promotes student learning and self-efficacy through frequent readiness quizzes (both individual and team-based) and team projects and applications. Departments in the College of Engineering and Information Technology (e.g., Computer Science; Chemical, Biochemical, and Environmental Engineering; and Mechanical Engineering) also have redesigned courses to use more collaborative learning or TBL or experiential learning. While collaborative learning has often been demonstrated as an effective learning-centered approach, the NCAT method had not placed great emphasis on it.

- The **University of Maryland College Park** has created a Teaching and Learning Transformation Center, directed by an Associate Provost. TLTC is using FY14 enhancement dollars, Provost Office funds, and departmental matching funds to offer one of the larger course development programs in the System. Faculty who want to become "Elevate Fellows" describe on a key challenge or problem within their courses. The selected courses must have strategic value to their program. The Fellows work with TLTC specialists to plan the development and testing of their course. Their plans need to take advantage of research-based ways of improving learning such as active learning and enhanced faculty-student contact. TLTC is developing an evaluation strategy to study whether redesign is leading to increased student engagement, which in turn is likely to produce better learning.
- **University of Maryland Eastern Shore** was the single most active USM institution in the initiatives, with twelve funded redesigns (out of the initiatives' fifty-seven). A UMES report estimates that, to sustain the redesigned courses after the start-up funding, the Division of Academic Affairs provides financial support (~$200,000/academic year) for:
    - Academic support networks (peer tutors, graduate teaching assistants, course coordinators, faculty released time) and
    - Infrastructure improvements (clickers, computers, interactive whiteboards, software).

  The decision to make that investment was probably made easier by the estimated $400,000/year of faculty resources freed by the redesign (some of this total represents the time of full-time faculty who can now teach additional sections or courses).
- **University of Maryland University College** is in an entirely different situation in part because it competes against proprietary programs on a large scale and is forced to be rather nimble in order to survive. UMUC became interested in course redesign even before the Regents called for the program to begin in USM. They participated in the MCRI, but decided to move ahead more quickly, initially by engaging NCAT for themselves. Recently, when their largest corporate client, the US military, called for courses that would be completed in fewer weeks, UMUC began applying backward design to all their courses in order to maintain quality. Although this work bears some resemblance to the changes emerging from the initiatives and the new strategic plan, it is more accurate to say that UMUC's activities in this sphere are a response to the marketplace and would have unfolded this way no matter what the System Office did or did not do.

Attachment C: Breakdown of Course Redesign Initiatives by Institution

Redesigned courses by institution and by initiative.

Institution	MCRI (2006-09)	Carnegie I (2011-12)	Lumina I (2011-12)	CCA (2012)	Carnegie II (2012-13)	Carnegie III (2013-14)	Total
Bowie State	0	1				2	3
Coppin State	1			1	1		3
Frostburg State	1	1	1		2	4	9
Salisbury	1	2				1	4
Towson	2				3	1	6
Univ. of Baltimore	1	1	2			1	5
Univ. of MD, Baltimore	1				1		2
Univ. of MD, Balt. County	1	1			3	1	6
Univ. of MD College Park	1	1			1	3	6
Univ. of MD Eastern Shore	1	5	1		1	4	12
Univ. of MD Univ. College[14]	1						1
TOTAL	**11**	**12**	**4**	**1**	**12**	**17**	**57**

[14] UMUC was interested in course redesign from the start. Even while taking part in MCRI, they began taking their own independent approach to course redesign. At this writing, the institution's entire academic program is being redesigned.

Attachment D: Institutional Self-Assessment of the Foundations

Foundation	*Is this an asset for learning-centered improvement at your institution? A barrier? In what ways?*	*What steps should be taken to strengthen this foundation, if any?*
1. **Persistent, consistent, patient leadership** encouraging focus on learning outcomes, improvement of learning for all students, creative reallocation of resources, and taking the long view		
2. Institutional culture of **working collaboratively across silos** to frame and solve problems beyond the reach of any single unit		
3. People's **beliefs about the nature of learning and teaching**		
4. Has the institution been **encouraging and helping large numbers of faculty to try simple elements of learning-centered practice** such as think-pair-share or minute papers, to make them more comfortable trying more ambitious steps later on?		
5. Are **infrastructure and support services** adequate for your Initiative at full scale? Classrooms? Means of transporting students to field sites? Tech support for the range of people who will need it? A course for trained student assistants if faculty could use their help to succeed with new teaching approaches?		
6. Institutional services for **feedback and evaluation** essential for learning-centered practices (1) helping faculty assess higher order learning more efficiently; (2) providing better feedback about student learning as they progress through their programs; (3) helping faculty and staff assess (and then improve) their use of professional and student time, space, and budgets; (4) feedback from students to faculty and staff about programs.		
7. **Appropriate faculty personal policies and practices**. For example, teaching load credit for enlarged sections; release time for helping create the initiative; paying adjuncts to progress, not just to teach as they have taught; interpreting student feedback for promotion and tenure cases in light of changes faculty had just made in a course.		

Attachment E. List of Interviewees

1. Allen, Diane; Provost, Salisbury University
2. Allen, Kimberly; Instructor, Nursing, Salisbury University
3. Baradwaj, Rajalakshm J.; Senior Lecturer in Mathematics and Statistics, University of Maryland, Baltimore County
4. Bayard, Jean-Pierre; Associate Director of Learning Design and Technologies, California State University System
5. Bederson, Ben; Associate Provost of Learning Initiatives and Executive Director of the Teaching & Learning, University of Maryland, College Park
6. Bemis, Rhyannon; Assistant Professor of Psychology, Salisbury University
7. Bondy, Mary Jo; Director of Graduate Studies, University of Maryland, Baltimore
8. Boughman, Joann; Vice Chancellor for Academic Affairs, University System of Maryland
9. Boules, Raouf; Professor of Mathematics, Towson University
10. Bowman, John; Vice Provost, Frostburg State University
11. Bradley, Megan E.; Professor of Psychology, Frostburg State University
12. Brightman, Joe; Instructional Designer and Technologist, Office of Academic Innovation, Towson University
13. Brown-Robertson, LaTanya; Associate Professor of Economics, Bowie State University
14. Cameron, Katherine; Assistant Professor of Psychology, Coppin State University
15. Campbell, Catherine; Professor of Biology, University of Maryland University College
16. Cousin-Gossett, Nicole; Lecturer in Sociology, University of Maryland, Baltimore County
17. Cutler, Audrey; Senior Instructional Designer/Trainer, Office of Academic Innovation, Towson University
18. Dyer, LaTonya; Manager of Course Development Support, Office of Academic Innovation, Towson University
19. Fiala, Kelly; Associate Dean in Seidel School of Education and Professional Studies, Salisbury University
20. Fink, Gayle; Assistant Vice President for Institutional Effectiveness, Bowie State University
21. Fitzpatrick, Carolyn H.; Senior Lecturer in English, University of Maryland, Baltimore County
22. Foster, Anthony; Associate Vice Chancellor for Accountability and Planning, University System of Maryland
23. Freiberg, Karen, Senior Lecturer in Psychology (retired), University of Maryland Baltimore County
24. Garmon, Lance; Assistant Professor Psychology, Salisbury University:
25. Geirasch, Tiffany; Sr. Lecturer in Chemistry, University of Maryland, Baltimore County
26. Graham, Steven; Sr. Associate Vice President, University of Missouri System
27. Gregory, Sadie; Provost, Coppin State University
28. Gutberlet, Ron; Assistant Professor of Biology, Salisbury University
29. Harbinson, Lynn; Project Manager, Academic Affairs, University System of Maryland
30. Hay, Stefanie; Assistant Professor of Nursing, Frostburg State University
31. Hodges, Linda; Associate Vice Provost for Faculty Affairs & Director of Faculty Development Center, University of Maryland, Baltimore County
32. Jester, Wanda; Lecturer, Biology, Salisbury University
33. Jakubik, Stan; Assistant Vice Chancellor, University System of Maryland
34. Jiru, Mintesinot B.; Associate Professor of Natural Sciences, Coppin State University
35. Jones, Angela; Lecturer, Bioengineering, University of Maryland, College Park
36. Kardiasmenos, Katrina; Assistant Professor of Psychology, Bowie State
37. Katenkamp, Angela M.; General Associate in Orientation Department, University of Maryland, Baltimore County
38. Kehe, Judith; Interim Assistant. Vice President of Academic Affairs, Coppin State University

39. Kephart, Kerrie; Associate Director for Pedagogical Innovation, Research, and Assessment, University of Maryland, Baltimore County
40. Kice, Brent; Associate Professor, Mass Communication, Frostburg State University
41. Kirwan, William E. (Brit), Chancellor, University System of Maryland
42. Kurek, Kim; consultant, Director of Developmental Math, Frostburg State University
43. Kramer, Sabrina; Assistant Director Teaching and Learning Transformation Center, University of Maryland, College Park
44. Levy, Gary; Associate Provost for Academic Resources and Planning, Towson University
45. Lombardi, John J.; Professor of Mass Communications, Frostburg State University
46. MacDougall, Elaine M.; Part-time Lecturer in English, University of Maryland, Baltimore County
47. Maier, Karl; Associate Professor of Psychology, Salisbury University
48. Marinaro, Laura Marie; Lecturer, Professional Studies, Salisbury
49. Mathews, Deborah; Director of the Office of Innovation in Teaching and Learning, Salisbury University
50. McCloud, Mary Beth; Assistant Professor of Nursing, Frostburg State University
51. Neapolitan, Jane; Assistant Provost for Academic Innovation, Towson University
52. Norris, Benjamin; Assistant Professor, Chemistry, Frostburg State University
53. O'Brien, Eileen; Lecturer of Psychology, University of Maryland, Baltimore County
54. Passmore, Ben; Assistant Vice Chancellor for Administration and Finance, University System of Maryland
55. Perks, Harry, M.; Senior Lecturer in Biochemistry, University of Maryland, Baltimore County
56. Pitula, Joe; Professor of Biology, University of Maryland Eastern Shore
57. Roberts, Scott; Director of Undergraduate Studies, Psychology, University of Maryland, College Park
58. Roth, Tatiana; Assistant Professor of Natural Sciences, Coppin State University
59. Shapiro, Nancy; Associate Vice Chancellor of Academic Affairs and Special Assistant to the Chancellor for P-20 Education, University System of Maryland
60. Shaw, Jr., William H.; F/T Non-Tenure Track Professor of Mathematics and Computer Science, Coppin State University
61. Shivnan, Sally A.; Senior Lecturer in English, University of Maryland, Baltimore County
62. Smith, Betty; Faculty Member in Biological Sciences, Salisbury University
63. Smith, Rochelle, F.; Professor of English, Frostburg State University
64. Spicer, Donald; Associate Vice Chancellor and CIO, University System of Maryland
65. Swan, Lisa; Graduate Assistant, Office of Academic Affairs and Provost, University of Maryland, College Park
66. Tasch, Jeremy; Assistant Professor, Department of Geography and Environmental Planning, Towson University
67. Twigg, Carol A.; President and CEO, National Center for Academic Transformation
68. Vignare, Karen; Associate Provost, Center for Innovation in Learning, University of Maryland University College
69. Walsh, Paul; Assistant Vice President for Academic Innovation and Instructional Support, University of Baltimore
70. Weber, Marguerite; Dir. Of Academic Initiatives, University of Baltimore
71. Whitehead, Kimberly; Interim Associate Vice President for Academic Affairs, University of Maryland Eastern Shore

Attachment F. About the Authors

Stephen C. Ehrmann, Ph.D., joined the University System of Maryland in September 2014 as Associate Director for Research and Evaluation at the Center for Academic Innovation. Carrying out this study was made his first major assignment. His research in this area began in the 1970s when he studied how MIT's Department of Civil Engineering had adapted through innovation, educationally and organizationally, over three decades and also did a study of how The Evergreen State College was subtly regressing from its innovative beginnings and why those changes were going unnoticed.

In 1978, Dr. Ehrmann became a program officer with the Federal Government's Fund for the Improvement of Postsecondary Education (FIPSE), specializing in educational uses of technology and factors influencing an institution's capacity to improve instruction. He also supplied program evaluation support to project directors as he had while Director of Educational Research and Assistance at Evergreen.

From 1985-1996, Dr. Ehrmann served as Senior Program Officer for Interactive Technologies at the Annenberg/CPB Projects. During that time he began developing the Flashlight Program for the Evaluation and Improvement of Educational Uses of Technologies. Flashlight developed evaluation methods and tools, and also carried out evaluations of innovative projects. In 1996, Dr. Ehrmann took Flashlight to the American Association for Higher Education (AAHE) and then to the new non-profit Teaching Learning and Technology Group (TLT Group) of which he was founding vice president. As Director of Flashlight, Dr. Ehrmann led two studies relevant to the current study:

- An evaluation of the comparative success of three dissemination strategies intended to foster use of JSTOR, online library resource. (The most successful strategy for increasing JSTOR use institution-wide was pairing a faculty member and librarian to redesign a course.)
- A study of the spread of ideas and materials developed for their own courses by MIT faculty receiving grants from the MIT-Microsoft iCampus Program. For most iCampus projects, there was little or no use of materials beyond the faculty member who had received the grant. So the study studied five projects with the greatest success in spreading the use of their software. One important factor was whether the iCampus-funded faculty member and potential adapters had a prior history of discussing the kind of educational improvement advanced with the grant. Few MIT faculty had such networks so, for the most part, dissemination was extremely difficult.

Dr. Ehrmann served as Vice Provost for Teaching and Learning at the George Washington University (2011-2014). While at George Washington, he did two evaluations. In one, he and his colleagues examined the educational impact of making video recordings of lectures available to students to study (the resource was ignored by around half the students but a quarter of the students believed that, without the videos, their grades would suffer). In the other, he studied the impact of helping faculty develop an online course upon the nature of their teaching on campus (the impact was substantial).

Dr. MJ Bishop is the inaugural director of the University System of Maryland's Center for Academic Innovation, which was established in 2013 to enhance and promote USM's position as a national leader in higher education academic innovations. The Center conducts research on best practices, disseminates

findings, offers professional development opportunities for institutional faculty and administrators, and supports the 14 public institutions that are part of the system as they continue to expand innovative academic practices.

Prior to coming to USM, Dr. Bishop was Associate Professor and Director of the Lehigh University College of Education's Teaching, Learning, and Technology Program where, in addition to being responsible for the institution's graduate programs in instructional technology, she also played a leadership role in guiding the general and special education teacher preparation programs through a curricular overhaul to address the new Pennsylvania Department of Education (PDE) guidelines for teacher certification.

While at Lehigh, Dr. Bishop received several awards for her research and teaching including the 2013 Stabler Award for Excellence in Teaching for leading students to "excellence in their chosen field" as well as "excellence as human beings and as leaders of society." In addition to her teaching, MJ was project director and a Co-PI of the Clipper Project, a 5-year Andrew Mellon funded research project aimed at evaluating the short- and long-term costs and benefits associated with offering Web-based courses to high-school seniors who had been "pre-admitted" to the university.

Prior to Lehigh, MJ was a software development project manager and Vice President for Operations on the Multimedia Thinking Skills (MMTS) project (funded by CAETI and National Science Foundation under subcontracts from George Mason University) where she was principally responsible for the daily management of the MMTS project, including formative and summative evaluation of the modules developed.

Author of numerous national and international articles, Dr. Bishop's research interests include exploring how various instructional media and delivery systems might be designed and used more effectively to improve learning and teaching. MJ holds a doctorate in instructional design and development from Lehigh, a master's in English from Millersville University and a bachelor's in political science and English from Lebanon Valley College.