A SHIFTING APPROACH
to LEARNING at KU

A report from the Provost’s Task Force on Course Redesign

Spring 2014
A Shifting Approach to Learning

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Executive Summary: Overview

Course redesign has grown in importance over the past few years as student needs and expectations have changed, as educators have been asked to provide better evidence of learning, and as national priorities, rising college costs and declining state revenue have pushed the University to focus on retaining more students and helping all students graduate in a timely manner.

A few key facts help illuminate the need for course redesign:

- KU loses more than 20 percent of freshmen after their first year. The University has set a goal of reducing that by 10 percentage points by 2021.
- According to the Office of Institutional Research and planning, 116 undergraduate courses at KU have more than 100 students, and 279 have more than 50 students.
- Only about 40 percent of students at research universities surveyed by the National Survey of Student Engagement in 2013 reported that their instructors used what the survey defined as effective teaching practices.
- K-12 instruction is rapidly increasing its use of technology and of classes that blend online and in-person components.
- Flipped and hybrid courses use technology to help faculty members spot student problems before face-to-face meetings, allowing them to adapt instruction and make better use of class time. As a result, many instructors have reported improved student learning.

The increased emphasis on student learning that we propose is hardly radical. It draws on ideas put forth from such organizations as the Association of American Colleges and Universities, the Boyer Commission, the State Higher Education Executive Officers, the Carnegie Foundation and the U.S. Department of Labor, among others. We have drawn on those ideas and others as we have made specific recommendations for change at the University of Kansas.

The University has made important progress in redesigning courses over the last two years. Since fall 2012, the Center for Online and Distance Learning has helped redesign more than 50 courses representing 178 class sections. In addition, 25 large courses in 15 departments and programs have initiated redesign through the C21 faculty-led course redesign consortium, the teaching fellows program, and CTE programs since 2013.

Clearly the University has momentum in this area, but it must accelerate change to reach more departments and more students. Broadening course redesign will require additional resources to support faculty, staff, and departments, and revision of policies that encourage cultural changes in the way the University approaches teaching and learning.
This report contains three sections aimed at articulating the needs of students, faculty, staff, and the University.

- **Part 1 provides a summary of our recommendations.**
- **Part 2 provides an overview and justification of course redesign.**
- **Part 3 offers a more detailed explanation of our recommendations.**
- **Part 4 provides ways of measuring success of course redesign.**
Part 1: Key recommendations for action

1. **Identify key courses for redesign and build out from there.**

Early efforts should concentrate on courses taught regularly by faculty members who value course redesign. Some departments have already done this, but others should adopt this approach before moving to these:

- Large entry-level courses with high DFW rates.
- Entry-level courses that primarily use lecture.
- Courses that are critical to students’ success in their majors.
- Courses that meet learning outcomes for the KU core.
- Courses that serve students from a variety of majors.

2. **Encourage collaboration within departments and within the university, and encourage collaboration with outside institutions**

For course redesign to succeed, **faculty members and departments must work together**. This will require sometimes difficult discussions about the direction, goals, and methods of courses and curricula, and a willingness to share course materials. It will also require continual monitoring of methods and student learning so that courses don’t revert to ineffective formats on the whim of individual faculty members.

The University must also **sustain and expand a community of faculty and students who champion innovative teaching and learning**. Promote course redesign and share their experiences with colleagues. The **C21 program is a crucial part of this**, but we need to provide more opportunities for instructors to develop new skills needed for redesigned courses, share examples of meaningful and sustainable assessment, and increase development and use of repositories of shared learning materials.

**The University should build on and expand its relationships with organizations that are promoting a culture of openness to innovative educational practices.** These organizations include the Bay View Alliance, the APLU Personalized Learning Consortium, and the Public Flagship Network. Individual departments should work with discipline-specific organizations, and the University should reach out to media organizations to tell the story of its work in course redesign.

3. **Expand C21 and the use of post-docs and undergraduate TAs**

Devote additional funds to sustain C21 in 2014-15 and to increase the number of post-docs assisting with course redesign. Such investments would propel the
Redesign of additional courses and encourage more faculty members to undertake course redesign. Additionally, professors who teach large classes need assistance to manage active learning approaches. Undergraduate teaching assistants who serve as lecture facilitators and receive the appropriate training are a cost-effective means of doing this. Discipline-based education researchers can also play an important role in bringing in external grants to sustain evidence-based practices.

4. **Recognize and reward effective teaching**

Redesigned courses require an additional front-end commitment of time to prepare and to teach, and often take a couple of semesters to refine teaching and assessment activities for optimal student success. **Promotion and tenure policies should specifically reward faculty members who engage in innovative teaching, document student learning, and share their successes and failures.** Faculty who agree to redesign courses should receive time to develop these courses and/or the assistance of graduate students or post-docs.

5. **Increase funds for classroom redesign**

Redesigned courses require collaborative spaces. We recommend an immediate infusion of $2 million to redesign two 40-seat classrooms in Wescoe Hall, begin to convert space in Anschutz Library into a centrally scheduled collaborative classroom, and to begin work on remaking 330 Strong into a large collaborative space. Additionally, we recommend that the University devote at least $800,000 a year to remake classrooms.

6. **Make better use of technology for learning**

Technology plays a large role in the lives of today’s students. It also provides efficient means of finding and analyzing information for both students and faculty members. To improve and accelerate use of flipped, hybrid and online classes, we recommend, among other things

- a bring-your-own-device model for students and for classrooms;
- expansion of free or low-cost software availability for faculty and students;
- creation of an experimental classroom for testing new technology for learning;
- expansion of the number of classrooms with videoconferencing;
- creation of a faculty advisory panel on technology and learning.
Part 2: Overview

Course redesign is an important part of improving student learning, and is a critical component of our strategic plan, Bold Aspirations. Course redesign has grown out of faculty interest in increasing student engagement in the classroom, enriching student learning, and improving learning outcomes. It has been supported heavily by initiatives in the Center for Teaching Excellence and the Center for Online and Distance Learning. Through the leadership of Dan Bernstein and others, KU has been at the forefront of national initiatives in course redesign, “flipping” the classroom, creating hybrid class models, and developing course materials intended to improve student learning and allow sharing across institutions. Dozens of KU courses are being taught with flipped or hybrid models, or are undergoing significant redesign to improve student learning.

These initiatives above have positioned KU to take a dramatic step toward developing and using modern technologies and student-centered pedagogies to improve student learning across the campus. Our target is to make hybrid technologies and student-centered teaching pedagogies the primary way in which we provide education and instruction for our students. The Course Redesign Task Force was convened to provide the high-level framework, the mission, the vision, and the goals for KU’s move toward use of teaching technologies and student-centered pedagogies to increase student engagement, student learning, and student academic success.

The specific responsibilities of the Course Redesign Task Force are as follows:

1. Setting goals, targets, and expected outcomes for course redesign.
2. Developing the general principles that KU should follow in identifying courses and departments for course redesign.
3. Promoting measurement of student learning in redesigned courses.
4. Considering how best to collaborate within KU to develop shared learning materials, pedagogical practices, and common platforms.
5. Considering how best to collaborate with other institutions to develop shared learning materials and common platforms, relying at least in part upon the collaborations already formed between KU and other institutions through the Bay View Alliance, the Flagship Partners Network, and the APLU initiative in course redesign.
6. Making recommendations of resources necessary to support faculty and departments in sustainable redesign projects.
7. Making recommendations about the relation between course redesign and classroom space, assignment, and use.
Why and how should courses be redesigned?

Traditional curricula were created at a time when information was scarce and students relied on faculty members as a central source of wisdom. As the volume of accessible information has swelled through use of technology, students’ needs and expectations have changed, and faculty roles have shifted from delivering information to helping students learn to analyze, synthesize, and interpret information. To meet the needs of all those students the University and its curricula must change.

Students arrive at the University with wide differences in knowledge, study skills, language skills, determination, life experience and background. Most have grown up with digital technology, though nearly all need a better understanding of how to use digital technology for learning.

The most compelling reason for course redesign is that research and experience are showing that student-centered classes improve student engagement and learning. This has been borne out in studies of flipped and hybrid courses nationally, most recently by a major meta-analysis of hundreds of studies in the Proceedings of the National Academy of Sciences. Active learning made a large difference in both learning and success rates in a wide range of course varying in field and class size, when compared with traditional lecturing. At KU, faculty members such as Susan Williams in engineering and Mark Mort in ecology and evolutionary biology have demonstrated the powerful improvement in student success when students are accountable for preparation before class and class time is devoted to active learning of the most challenging material and concepts.

A note of caution: Flipped and hybrid courses provide no magic solutions to improving learning and reducing rates of drops, failure and withdrawals. They require a different mindset inside and outside the classroom, along with faculty members who are determined to change their approach to teaching and are willing to experiment and adjust.

The chart on page 10 shows core elements of the changes that are taking place at all levels of education, and the chart on page 9 explains some of the terminology and approaches to learning that are in use today. No single approach fits all students, and most courses use a combination of these elements depending on the type of class, the needs of students and the philosophy of faculty members. Clearly, though, courses must move toward a student-centered model if the university hopes to keep pace with today’s students.

A shift to a more student-centered approach to course design involves many changes in instructional strategies and goals. The intent is to promote a range of higher order-learning outcomes. Redesigned courses also decrease the use of multiple-choice exams and other types of objective evaluation and increase emphasis on these elements:
- Open-ended assignments.
- Collaborative projects and collaborative learning.
- Writing assignments, essay-based exams, papers and projects.
- Service learning.
- Portfolios to demonstrate student learning.

This model also increases emphasis on learning outcomes, along with a clear demonstration of how each course leads to the next and contributes to a particular major or to general education goals. (See Part 4 of this report.) It also promotes use of capstone courses or experiences that require students to draw on the cumulative skills gained in previous courses in their majors.
A shifting approach to learning

Traditional curricula were created at a time when information was scarce and students relied on faculty members as a central source of wisdom. As the volume of accessible information has swollen through use of technology, students’ needs and expectations have changed, as have faculty members’ roles. If the university is to thrive, curricula must change, as well. The model below shows core elements of the changes that are taking place at all levels of education. No single approach fits all students, and most courses use a combination of these elements depending on the type of class, the needs of students and the philosophy of faculty members. Clearly, though, courses must move toward an active and collaborative model if the university hopes to keep pace with today’s students.

<table>
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<tr>
<th>More reliance on ...</th>
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<td>Traditional</td>
<td>Contemporary</td>
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<td>Lecture</td>
<td>Collaborative work</td>
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<td>Homework assignments</td>
<td>Tech-enhanced learning</td>
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<td>Tests and quizzes</td>
<td>In-class activities to encourage analysis, synthesis, and application</td>
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Engagement of students

- **Emphasis on lecture:** students sit in rows and listen passively; they rarely engage one another
- **Little use of technology, except PowerPoint**
- **Out-of-class time spent on homework exercises, memorization and studying for exams**

- **Most courses fall into a middle ground between these two approaches.**
- **Extensive and deliberate use of technology, especially students' own devices, to aid learning**
- **Out-of-class time spent on application of knowledge and preparing for face-to-face discussions and engagement**

**Curriculum and assessment**

- **Individual control of courses**, including course content, learning goals, and materials; little communication among instructors
- **Curriculum based on assumed general principles and historically developed prerequisites; often little attention paid to how each course fits into the broad curriculum**
- **Primarily uses multiple-choice tests, similar forms of evaluation**
- **Success determined primarily by student evaluations, normative distribution of grades, and DFW rates**

- **Shared control of courses**, with teams of instructors pooling course materials and working toward common goals; regular communication among instructors
- **Curriculum based on coordinated goals of the major or department, with awareness of how each course fits into the progression of the major or degree program**
- **Emphasis on writing, group projects, open-ended assignments**
- **Success determined by evidence of mastery of skills, as well as students' success in future courses, especially capstones**
Course formats for improving learning

As instructors have experimented with technology to help students learn, courses have taken on many different formats. Some shift routine class materials online but keep the same number of contact hours, using time with students to address problem areas and delve more deeply into material. Others use online components to reduce the amount of time students spend in the classroom. The terms used to describe courses often vary, but these are some of the common approaches used in education today.

**Media-enhanced**

What is it? A large course that uses clickers and other technology to improve student participation, discussion and engagement.

What happens in class? Mostly lecture, interspersed with question-driven group work.

How does it benefit students? Technology helps break up the tedious of lecture and allows students to be more active.

**Web-enhanced**

What is it? A course that uses Blackboard or another online site to provide a syllabus, readings, examples or other material to students.

What happens in class? Class time is generally unchanged.

How does it benefit students? Provides easy access to course materials. Can encourage students to be better prepared for class.

**Two variations of courses that mix online and in-person work**

**Flipped**

What is it? The name comes from “flipping” the class structure: Work usually done in a classroom is completed online. The number of hours in class is unchanged.

What happens in class? Emphasis on group problem solving; individual and group projects; interaction with instructor.

How does it help students? Online components allow students to complete background work at a time and at a pace that works for them. Instructors assess work before in-person meetings and use class time to focus on areas of the most need.

**Hybrid**

What is it? A hybrid course blends online course materials with a reduced number of in-person class sessions.

What happens in class? Emphasis on group problem solving; individual and group projects; interaction with instructor.

How does it help students? Online components allow students to complete work at a time and at a pace that works for them. Instructors assess work before in-person meetings and use class time to focus on areas of the most need.

**Online**

What is it? A course in which all work is done remotely. Students and instructors have contact only through such means as email, phone, text, discussion boards and live video connections.

What happens in class? This varies widely. In most cases, the online work mirrors that done in flipped or hybrid courses. In some cases, students and faculty may have discussions through live video or chat sessions (synchronous), though most work is generally done at convenient times for students (asynchronous).

How does it help students? Courses provide flexible participation times, connecting students remotely.
Part 3: Expanded list of recommendations
The executive summary of this document provided highlights of our recommendations. This section expands on those recommendations and provides additional details.

1. Identify key courses for redesign

Most courses at the University would benefit from changes that put more emphasis on active, deeper and more engaged student learning, and individual departments should determine which specific courses should receive priority. Given the University’s need to retain freshmen and to reduce DFW rates in large classes, we recommend the following general approach:

Primary characteristics of single courses that should be targeted for redesign:
- Early efforts should concentrate on courses taught regularly by faculty members who are especially interested in student-centered course design. Some departments have already done this, but others should adopt this approach before moving to these:
  - Large entry-level courses with high DFW rates.
  - Lower-level undergraduate courses that primarily use lecture (See Appendix II).
  - Courses that are critical to students’ success in their majors.
  - Courses that meet learning outcomes for the KU core.
  - Courses that serve students from a variety of majors.

Departments whose courses are targeted for redesign:
- Should demonstrate that they are working toward clearly articulated goals in student acquisition of knowledge, skills and deeper understanding of content in their disciplines
- Should have guidelines that articulate how each course fits within a curriculum, builds on previous skills, and provides students with knowledge and skills that will allow them to succeed in a discipline
- Should have guidelines for communicating student strengths and weaknesses to instructors at all levels of courses so that instructors can adjust material and emphases to better prepare students as they advance in the curriculum.
2. **Encourage collaboration within departments and within the university, and encourage collaboration with outside institutions**

For course redesign to succeed, **faculty members, departments and schools must work together**. This will require sometimes difficult discussions about the direction, goals and methods of courses and curricula, and a willingness to share course materials. It will also require continual cooperation of methods and results so that courses don’t revert to less effective formats on the whim of individual faculty members.

This will require support to sustain and bolster a growing community of faculty who champion course redesign. It will also require continued work with outside institutions to share materials and ideas for sustaining and improving course redesign.

**Departmental collaboration**

This involves these central elements:

- **Identify shared goals.** A course redesign team should identify shared goals for individual courses and entire curricula. Although there could be some variation across different offerings of the same course, there should be agreement on core learning outcomes, instructional methods, course material and syllabi.
  - As part of this process, the department should create a clear curriculum map showing how each course contributes to degree completion.

- **Collaboration.** Instructors who teach different sections of multi-section courses must work toward shared goals. Departments should require teamwork among instructors in those courses, including the sharing of course materials.

- **Shared materials.** The department should create a repository of course materials that instructors can contribute to and draw on.

- **Evaluation.** Departments must continually monitor and evaluate student learning outcomes associated with course redesign to ensure that goals are being met.

- **Leadership of chairs.** Department chairs, deans and university administrators should promote redesign among faculty members. This should include identification of professional development opportunities to help understand the need for course redesign, and incentives to faculty members to encourage course redesign.

- **Student input.** Departments should explain course redesign to students, making changes and expectations clear and soliciting student feedback to improve the process.
  - Making the syllabus for each course section available to students when they enroll would help with this. Ideally, courses with multiple sections will use a common syllabus.
Progression of skills
The content, feel and expectations for students should be noticeably different between first- and second-level courses, and between second- and third-level courses. Expectations for higher-level thinking and skills should rise as students progress through a curriculum. This can be achieved in several ways:

- Use of curriculum mapping to show clear progression of courses and skills.
- Increased use of learning analytics and data to provide feedback on student learning and progression in the curriculum.
- Identification of specific points in the prerequisite course learning that advance or hinder successful completion on subsequent courses.
- Identification of pre-requisite skills and achievement, recognizing that concepts need iterative development across courses.

Faculty collaboration
The university must sustain and expand a community of faculty and students who champion innovative teaching and learning, promote course redesign and share their experiences with colleagues. The C21 program is an important part of this (See recommendation No. 3), and we have other mechanisms in place, as the chart below shows. To improve on current efforts, we recommend the following:

- **Professional development.** Expand opportunities for instructors to develop new skills needed for courses. This includes on-campus work such as C21 as well as regional and national workshops and conferences.
- **Sharing of materials.** Create digital repositories where faculty can share and draw on course materials and examples of successful course redesign and meaningful assessment of courses.
- **Involvement of TAs.** Bring teaching assistants into more classes to monitor before they take on those classes themselves, and into learning communities around teaching. This will provide needed assistance for faculty members, especially in large classes, and will help teaching assistants gain new skills they can bring to classes they teach on their own.
- **Faculty recruitment.** Recruit faculty members to teach in redesigned classrooms.
- **University resources.** Coordinate and enhance institutional capacity to deliver online and hybrid teaching. This includes expanded availability of technology, redesigned classrooms, and broader use of undergraduate teaching assistants.
Collaboration with outside organizations
The University’s involvement with the Bay View Alliance, the APLU initiative, the Public Flagship Network, and other organizations has been invaluable in its work on course redesign. (See below.) We urge expanded involvement in these organizations and with organizations that provide expertise for course redesign in specific disciplines. These organizations offer several benefits:

- **Awareness.** They help raise awareness on the KU campus of activities that other universities are undertaking and ensure that KU is part of the conversation.
- **Identification.** They help determine the national activities in which KU should invest and share in developing.
- **Promotion.** They help promote broader faculty involvement in national activities.
- **Facilitation.** They offer valuable opportunities to share ideas and resources that will facilitate work on course redesign at KU.

Media awareness
The University’s work with national organizations must include outreach to news media to tell its story about course redesign. Nearly all messages from the KU News Service emphasize faculty research, and, with the exception of awards, the communications office has shown little interest in promoting effective teaching. This must change for several reasons:

- **Attracting undergraduates.** Competition for the best students is fierce, and the University must find ways to set itself apart. Promoting its efforts to change teaching and learning will appeal to most undergraduates far more than promotion of faculty research.
- **Reinforcing faculty.** Promoting the University’s efforts to the news media would publicly signal the importance of course redesign and provide reinforcement to faculty who have made course redesign a priority.
• **Attracting faculty.** Increasing the profile of course redesign will help the University attract better teachers by making its efforts part of a national discussion.

• **Attracting donors.** Course redesign provides opportunities to reach out to alumni with stories about improved opportunities for learning. This offers the potential to attract donations for such efforts as C21, teaching professorships and awards, and redesigned classrooms and buildings.

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**Bay View Alliance.** This consortium of nine research universities includes KU, British Columbia, California Davis and Indiana. The alliance, funded by a grant from the Sloane Foundation, has organized applied research on strategies for increasing adoption of evidence-based teaching practices in higher education. Its primary means of doing that has been development of research action clusters around different variables to test their role in propelling high-impact teaching practices. Dan Bernstein is one of the leaders of the BVA.

**Research Action Cluster on Embedded Expertise and Collaborative Course Transformation.** This research cluster within the BVA, led by Dan Bernstein and Andrea Greenhoot at KU, focuses on how academic leaders can stimulate adoption of evidence-based practices by placing “added expertise” (i.e., teaching postdocs or teaching faculty whose primary role is course redesign) to collaborate on course transformation in departments.

**Research Action Cluster Enhancing Fundamental Academic Skills.** This group within the BVA, led by Queens University in Ontario, focuses on how leadership and institutional processes can enhance the development of and assist in the recognition of fundamental academic skills.

**APLU initiative.** This initiative promotes collaboration between institutions in the Association of Public and Land-Grant Universities and community colleges to redesign high-enrollment introductory or gateway courses and enhance student learning and success in downstream courses. Emphasis is on adaptive and personalized learning.

**Personalized Learning Consortium (or Institutional Consortium Initiative).** This group consists of more than 50 institutions, including community colleges and four-year and research universities. KU is a sustaining member. The organization attempts to help institutions grapple with the rapid change in learning environments brought on by online tools and the widespread availability of information. It was funded by the Gates Foundation.
Public Flagship Network. This is a consortium of universities convened since 2011 to develop solutions to challenges faced by public research institutions. This network includes about 20 public flagship institutions within the Association of American Universities. Among its projects:

- Collaborative research-based projects, such as development and sharing of courses or course materials and use of innovative educational technologies. A major goal is to share online courses or online course materials. Most member institutions are interested in providing access to online courses (for a fee) but KU’s interest is in sharing course materials.

- Harnessing “big data” to drive educational decision making. This includes collecting, analyzing and sharing such data across institutions.

- Sharing strategies for communicating to the public about the need for continued investment in higher education and the value of public research universities.
3. Expand C21 and the use of post-docs and undergraduate TAs

C21, a learning community that focuses on course redesign, has been enormously successful in bringing together faculty members from many departments and providing guidance and collegial support for redesigning courses. We see it as a central component of expanding course redesign in the coming years.

We recommend that the university devote additional funds to continue C21 in 2014-15 and to double the number of post-docs assisting with course redesign. This would help redesign additional courses, provide successful models based on the most recent pedagogical developments, and encourage more faculty members to undertake course redesign.

The C21 initiative is already paying dividends, as seen in the number and variety of courses that have been redesigned as a result, as well as the number of departments and faculty members engaged in the work:

As additional faculty members redesign courses, we will have a growing pool of resources to draw on to provide new models of learning and to share expertise to colleagues. Given the popularity and success of C21, we propose providing additional funds to continue and expand it over the next three years. This would include the following:

- Expand activities, such as C21, that draw on a community of scholars to improve students learning across a variety of courses.
• Recruit greater participation from schools and departments that do not currently have a critical mass of faculty involved in course redesign.
• Raise the profile of previous and ongoing course redesign work on campus to increase participation and reward the good work of currently engaged faculty.
• Use previous and ongoing collaborative activities to develop online materials (modules) to guide and support course redesign work.
• Use successfully redesigned courses as models for future work.
• Develop and share public representations of redesigned courses and their effects on student learning.
• Consider future course redesign faculty seminars through CTE and within schools and the College.
• Promote sharing of course materials already developed in faculty seminars.
• Promote a “department team” approach to course redesign to facilitate development of shared materials and practices for individual courses.

Expansion of the Teaching Fellows (post-doc) program
The current program for using post-doctoral fellows for course redesign was supported by the College of Liberal Arts and Sciences and the Provost’s Office. The program provides three years of support to the post-docs, who partner with faculty to redesign large gateway courses. CTE, CODL, and the Center for STEM Learning have all organized program-level activities in support of the program.

The first three post-docs began work in Fall 2013 in biology, geology, and geography. In Fall 2014, we anticipate four more teaching post-docs. Over the last year, the first cohort has spent considerable time clarifying their responsibilities and finding ways to address unique challenges and remain productive within their departments.

One thing that has yet to be determined is the role that post-doctoral fellows will play at the University after the completion of their three-year term. At the University of British Columbia, teaching fellows have become long-term instructors in the courses they redesigned. Clarifying those opportunities would help with recruitment, as would clear guidelines on training and development of future fellows.

Introduction of education researchers into departments
Discipline-based education researchers could also play a role in the expansion of course redesign. Most of these researchers start in traditional disciplinary research but eventually shift into primary research in education, bringing in external grants that sustain evidence-based practices, and serving in educational leadership roles within their departments.

Some disciplines and universities are more open to these types of researchers than others. For example, Maine, Nebraska-Lincoln, Michigan State, Colorado,
Washington, and Georgia have all been successful with this approach, allowing them to bring in external funding and build programs that lend to long-term sustainability of course redesign.

Bringing in these types of researchers into departments can be a challenge, but with the right type of leadership and culture they can be very productive researchers in such areas as curriculum mapping, institutional change, and curriculum change.

**Expansion of use of undergraduate TAs**

Professors who teach large classes need assistance to manage redesigned courses. Undergraduate teaching assistants are a cost-effective means of doing this. These assistantships provide high-performing students with opportunities to learn in deeper ways by helping their peers, and offer additional money to pay for their education. In many cases, these TAs have successfully completed the course they assist with, and bring a fresh perspective that allows them to share their experiences with students who are new to a subject.

To expand the use of undergraduate TAs, we recommend the following:

- Provide about $40,000 a semester for departments to hire 375 undergrad TAs for courses with 50 students or more. This money should be made available only for courses that have been redesigned.
- Establish university policies and guidelines that explain the qualifications for, responsibilities of, and boundaries for undergraduate teaching assistants.
- Establish a general ratio of undergraduate TAs to students in a class. We recommend at least one undergraduate TA (10 hours per week) for every 50 students in large classes. Ideally, large classes will have a graduate teaching assistant who oversees the undergraduate TAs.
- Establish training sessions for and means of assessing the effectiveness of undergraduate TAs. These assistants must play a larger role than simply acting as graders and proctors. They must be trained on how to best communicate with students and promote active learning in the classroom.

**Use of GTAs to broaden the scope of course redesign**

While course redesign is well underway, transforming hundreds of courses and the methods by which they are taught is a gargantuan task that requires intellectual contributions from GTAs. We recommend creating a pilot program to train graduate students in course redesign and gradually expand the program to the entire University. This should include one course transformation fellow per year in each terminal-degree-granting department. The program will be an add-on to existing GTA positions.

We propose the following mechanism:

- **Create a Course Transformation Fellow Program.** This program would be for senior graduate students seeking terminal degrees in their
programs. For example, each of the 31 College of Liberal Arts and Sciences graduate programs offering a terminal degree could award one course transformation fellow per year, using a current GTA line in the department.
  o Winners of the internal competition would receive a $2,000 supplement to their salary, one month of summer salary at 0.5 FTE, and training and experience to make them more competitive for academic positions.
  o Fellowships would begin in the last month of the summer. That month would include instruction in course redesign and preliminary work on the courses to be taught during the fellowship period.
  o During the academic year, fellows would be assigned to act as instructor or co-instructor of record on one course each semester of the department’s choosing. Fellows would teach these courses and would design and implement modules to partially redesign each course.

• **Create a training program for the fellows.** Throughout the fellowship period, fellows would receive training in course design, evidence-based teaching practices, and approaches to active learning that are central to the course redesign initiative.

• **Create a capstone workshop.** At the conclusion of the program, fellows would participate in a capstone workshop that would include the production of teaching portfolios showcasing their teaching achievements and enhancing their competitiveness on the job market. Redesigned modules would be archived for future use by the fellow’s department. To ensure that the course modifications are captured by each department, each fellow would be assigned a faculty mentor familiar with or responsible for the courses being redesigned by the fellow.

• **Create a new position at CTE to oversee the fellows program.** To administer and sustain the Course Transformation Fellowship program, one full-time Ph.D.-level staff member with knowledge of course design and effective undergraduate pedagogy would be needed to offer graduate fellows training, mentoring, and feedback. This staff member would be housed within the Center for Teaching Excellence, and would also be tasked with organizing the program, and crafting additional teaching workshops for graduate students, postdoctoral fellows, and faculty throughout the university to expand knowledge of best practices in undergraduate instruction. This project is proposed as a five-year pilot project for departments in CLAS. The program should be University-wide and administered by the new staff person in CTE. This new CTE employee would be hired on a five-year contract, renewable upon performance, success of the program, and availability of funds. Salary and fringe would be approximately $90,000.

• **Create a pilot program within CLAS and then expand university-wide.** If a pilot included all of CLAS, it would have an impact on 31 departments and graduate students, and as many as 62 courses per year. Furthermore, the explicit training in teaching and course design and the opportunity to serve as instructors of record would make fellows in the course transformation program coveted commodities in an increasingly competitive
academic marketplace. These two outcomes contribute to the sweeping institutional improvements at the heart of *Bold Aspirations*.

- **Provide additional resources for a fellows program.** Costs for the fellows program and the new CTE position would total slightly more than $300,000 a year. Resource allocations associated with the program would include the following:
  - Each awardee would receive a $2,000 salary supplement or award (pilot example 31@$2,000=$62,000/year).
  - Each awardee would be employed in course redesign during one month of the summer at 0.5 FTE (pilot example 31@$1,700=$52,700).
  - Each department would use one of its GTA lines. Some department would need a supplement to fill discussion sections and labs vacated by the GTA who was elevated to the fellow position. In some cases, the teaching of two courses per year by the fellow would create no gap in coverage of necessary courses. In other cases, labs or discussion sections would need to be filled by other staff. Where staff could not be reassigned to fill the gap, additional UTA or GTA would be needed to take the place of the GTA who has been converted to a course transformation fellow. Estimated cost for a pilot of 10 programs would be $163,710: 10 GTAs@$16,371 yearly annual salary and fringe.
4. Recognize and reward effective teaching

Redesigned courses require an additional front-end commitment of time to prepare and to teach, and often take a few semesters to refine. **Consistent with current policies, faculty members who engage in innovative teaching, document student learning, and share their successes and failures should be rewarded.** Faculty who redesign courses should receive time to develop these courses, the assistance of graduate students or post-docs, or both.

Course Redesign efforts need to be a substantial and visible part of faculty evaluation plans in these areas:

- Promotion and tenure decisions
- Annual merit evaluations
- Post-tenure review
- Progress toward tenure review

To help achieve that, we recommend the following:

- Revamp the PRO online reporting system so that it includes areas on course redesign, and teaching and learning.
- Move beyond student course evaluations in determining excellence of teaching. The current review of teaching by department peers should explicitly include evaluation of the quality of instructional design in light of current knowledge of optimally effective teaching practices.
- Faculty evaluation of teaching should take into account evidence of high-quality course design implementation and effectiveness. This will require perspectives beyond the student voice. While traditional lecturing may constitute an acceptable level of competent instruction, significant evidence of course design based on current research on instruction in the faculty member’s field is needed to indicate very good or excellent performance in teaching. Demonstration of excellence in teaching must include evaluation of course goals, assignments, preparation for class, in-class active learning, and evidence of student achievement appropriate to the place of the course in its curriculum.
  - The Faculty Governance Task Force on the Evaluation of Teaching recommended, and the Chancellor signed, a set of procedures for peer review of teaching to complement student ratings. The materials suggested for such review included meaningful peer review of teaching practices based on portfolios of course design and effectiveness. **The report is available from the Faculty Senate archives.**
- Add language about the importance of course redesign to department and university documents that guide faculty evaluation, as well as promotion and tenure.
Promote evidence-based instructional design at the department level
To aid faculty members in acquiring the skills needed to demonstrate excellent teaching, programs and departments should be encouraged to coordinate teaching efforts to enhance student success. These activities could be documented in program review materials. Among those activities that would support a climate for innovation and evidence-based instruction are the following:

- Faculty should consult and collaborate with disciplinary experts within their program to determine the coursework that is critical to predicting student success.
- Faculty within major programs should determine which curricular components maximize efficient and effective use of classroom time with students.
- Departments should use common curricular objectives to establish an evidence-based approach to documenting student learning.
- Departments and administrators should obtain and use data from OIRP to identify potential hurdles to course and program readiness, and identify ways to encourage student success in redesigned courses.
5. **Increase funds for classroom redesign**

Redesigned courses require collaborative spaces. We recommend an immediate infusion of $2 million to redesign two 40-seat classrooms in Wescoe Hall, convert space in Anschutz Library into a centrally scheduled collaborative classroom, and to begin work on remaking 330 Strong into a large collaborative space. Additionally, we recommend that the University devote at least $800,000 a year to remake of classrooms.

**Relationship between course redesign and classroom space**

The vast majority of KU classrooms were created for professor-centered, top-down instruction. Their crowded, static design leads to a passive atmosphere in which students sit and wait for instructors to tell them what to do.

Modern classrooms, on the other hand, revolve around the concept of active learning, providing a flexible, student-centered environment that promotes collaboration. Active learning uses techniques that put more responsibility on students to define problems, gather information and provide solutions. Instructors lecture little or not at all, and often use a flipped or hybrid approach that allows them to move deeper into course material. They often use technology inside and outside class to enhance learning.

Several universities around the country have adopted this new style of room design and technology use, and research has shown benefits to this approach. Based on that research, as well as our own observations and experiences, we recommend that the university take a more aggressive approach in creating collaborative classrooms. Specifically, we suggest these steps:

**Create a unified budget for classroom renovation**

Currently, Capital Planning (furniture, lighting, flooring and other room elements) and Information Technology (wiring, projectors, media cabinets, screens and other technology) have separate budgets for renovating classrooms. Under this system, technology expenditures require the approval of the chief information officer, a process that has severely delayed classroom renovation.

To ease these delays, we recommend a unified budget for classroom remakes. This would not only make the renovation process run more smoothly but would make costs more transparent. We also recommend that university staff members who oversee and repair the equipment have spending authority for routine classroom technology replacement and for purchase of standard equipment in renovated classrooms.

**Guarantee at least $800,000 per year to classroom renovation**

The university currently devotes $500,000 per year from tuition enhancement funds to renovating classrooms and $9 million to repairing buildings. Nearly all of that $9 million goes toward infrastructure, including such things as electrical
wiring, boilers, roofing and general repairs. In some years, part of the renovation budget also goes toward infrastructure.

To speed up renovation and to ensure that classrooms are continually upgraded, we recommend that the university designate at least $2 million toward immediate classroom renovation and devote at least $800,000 each year for renovation. In addition, those funds should not be used for general building repairs.

**Adopt central scheduling of university classrooms**

Central scheduling of university-controlled classrooms would give faculty members a better chance of getting the types of classrooms they need. This is a highly contentious issue. Schools and departments have long had first-pass options on certain classrooms and will resist any change to the current system. So will faculty who demand specific classrooms, often as close to their offices as possible. To ease that tension, we suggest doing the following:

- Phase in central scheduling over three years.
- Create a transparent scheduling system that allows departments to see available space based on room size, seating, technology and other characteristics, and to match classes with the appropriate space. (*See Appendix II for examples from other universities.*)
- Test that scheduling software at least a year before it is used live. Run tests showing how central scheduling will not change the location of many current classes.
- Make the case that central scheduling will not affect labs, conference rooms or specialty spaces that departments have created.
- Give priority scheduling to faculty members who have worked on course redevelopment.

**Increase classes after 2 p.m.**

As the consultants’ report makes clear, the university has plenty of classroom space. The problem is that classes are clustered in the middle of the day, generally between 10 a.m. and 2 p.m. If we spend money on remade rooms, we should make sure those rooms are used as much as possible. This would involve a cultural change at KU. As such, it would require time and patience to find the best approaches to reach out to faculty members and students.

**Work with other Kansas universities to change Regents space guidelines**

Modern classrooms require additional space for collaboration and movement. If these plans are to succeed, the university must work with the Board of Regents to change guidelines for classroom use. Regents’ metrics encourage universities to put more students into classrooms than is prudent. Until those metrics change, KU and other universities will have a difficult time meeting regents’ guidelines.
**Create prototype classrooms**

Faculty members and school and department leaders need to see examples of how classrooms could be redesigned. Some of these rooms already exist (334, 335, 337 and 339 Strong; 202 Stauffer-Flint). The School of Engineering will open its new building in Fall 2014 and the School of Business plans to open its new building in Fall 2016. These buildings will provide additional classroom prototypes. Ideally, though, the university will create at least one redesigned classroom in each campus building to increase exposure of flexible, collaborative room redesign.

To make course and classroom redesign more visible, we recommend identifying at least three additional rooms that could be renovated in the next 18 months:

- **Large classroom**: 330 Strong. This room already needs to have seats replaced. By applying that money toward a remake, we could create a prototype of a large active-learning classroom. This would involve removing wooden risers that elevate theater-style seating at the back of the room; removing false walls near the two doors; replacing the current seating with tables and chairs that could be easily moved; moving the faculty work station to the center of the room; and replacing a single screen at one end of the room with screens on three of the four walls. In its current configuration, the room seats 178. A remake would reduce its capacity to about 120.

  *Projected cost: $1 million*

- **Medium-size classroom**. Use the second floor of Anschutz to create a centrally scheduled collaborative classroom that would seat about 90 students. (Note: This space in Anschutz is also being considered for a learning studio. Our discussions with Tracy Horstman suggest that the learning studio could fit into other space on campus. The campus has few spaces available for a 90-seat collaborative classroom, though.)

  *Projected cost: $300,000 once the space becomes available.*

- **Wescoe classrooms**: Classrooms on the fourth floor of Wescoe Hall could be remade into active learning spaces relatively cheaply and quickly. The biggest expenses would come from collaborative furniture, new media cabinets and repainting and other cosmetic changes to create a more engaging atmosphere. (See the prototype drawings on pp. 22 and 23.)

  *Projected cost: $45,000 each*
202 Stauffer-Flint Hall was remodeled into an active learning classroom over winter break.

**Classrooms that have been recently remade**

- Strong Hall 334 A and B (24 students), 338 A and B (24, but can be combined to create space for 48), 335, 337, 339
- 202 Stauffer-Flint (Above: 30 students)

**Classrooms scheduled for remodeling in 2013-14**

- EGARC lab in 4066 Wescoe Hall (planned opening is August 2014)

**Classroom priorities for three to five years**

- Summerfield Hall. The School of Business plans to move by Fall 2016, so rooms could potentially be remade by Spring 2017, depending on work needed to heating and cooling systems, and other infrastructure.
- Budig Hall. The lecture halls in Budig are the University’s largest and most visible. Remaking at least one of them in to a large collaborative space could give redesigned courses a real boost.
How classrooms on the fourth floor of Wescoe Hall could be remade

The rolling tablet armchairs (example below) would allow many room configurations, including the two below in a fourth-floor Wescoe classroom. The movable lectern would give instructors more flexibility and would allow them to face their classes, something they can’t do with current media cabinets.

**Cost:** $36,000

That includes:

- Rolling tablet armchairs
- New screen
- Rolling media cabinet
- Continuous whiteboards on three walls
- New carpet and paint
- 6 new power outlets
- New window shades

*Configuration 1: traditional*

*Configuration 2: collaborative*

Provide incentives to increase number of

Typical configuration of current rooms on fourth floor of Wescoe, along with new chair and lectern designs.
Wescooe configuration 2

This approach to remaking a fourth-floor classroom in Wescoe Hall would include arc tables that could be arranged in various collaborative shapes. The cost of the remake also includes a movable lectern with cords tethered to the wall. The cost for this renovation would be the same as the previous example.

**Cost:** $36,000

Remake would include:
- Arc tables (right)
- 36 chairs
- New screen
- Rolling media cabinet
- Continuous whiteboards on three walls
- New carpet and paint

Two examples of how the tables could be arranged for collaboration.

*Designs by Tracy Horstman*
What do redesigned classrooms look like?
Modern classrooms revolve around the concept of active learning. They promote collaborative, student-driven learning in which an instructor works more as a guide than an authority figure.

The design process for new classroom spaces for the School of Engineering offers many insights for the university as it moves toward modern classroom designs. These new designs and techniques emphasize collaboration, with research showing gains in student learning. Common elements among these new designs include the following:

• **Group-centered, active learning environments.** Students in these environments are challenged to collaborate and communicate to solve large, open-ended problems, the sort of work that once would have been done outside class. By incorporating challenging problems in the classroom, instructors have the opportunity to guide student development and correct misconceptions early in the learning process.

• **Space for movement.** Modern classrooms generally have more room for movement and rearrangement than older classrooms.

• **Flexible furniture.** This includes tables and chairs, individual seats and lapdesks that move together and create a collaborative environment. Lecture seating allows students to swivel and collaborate easily with colleagues beside, in front of and behind them.

• **Whiteboards.** These might be attached to walls, on moving stands or in pieces that can be mounted on wall tracks. They help students share ideas during collaboration.
Mock-up of new classroom spaces designed for engineering expansion

The Scale-Up Model

A wealth of research on classroom design and improvements in learning and knowledge retention supports the development of new teaching methods and classroom settings. One method, named Scale-Up by Prof. Robert Beichner of North Carolina State, was based on years of comparative studies between traditional classroom and teaching and his Scale-Up model.

The model requires that the static lecture portion of a class be pre-recorded and made available online. Students come to class to work in groups and solve problems that are often open-ended and more complex than a single student would be expected to solve within an hour of class time. The students are assigned to groups and work around tables (three options are shown right and left). White boards are available to each group. At the beginning of class the professor introduces the topic and the problem, and the students work within their groups, or across groups, to gather information and solve the problem. The professor and teaching assistants navigate the room to help resolve problems and point groups in a productive direction. Three typical setups are shown here.
Examples from Purdue
A number of different classroom styles were observed at Purdue University. A traditional lecture hall was modestly modified to allow group interaction by using a gently-sloped tiered system, and extra wide tables that allow students in a front row to turn around and work with students in the back row (see picture on the right). The tables were numbered so that the instructor could call on a group from the front of the room.

The second image shows a wide room that had two screens at the front of the room to allow proper viewing angles for all students. High ceilings allowed the projection surface to be placed above chalkboards.

Purdue has a lab dedicated to freshman engineering courses, which are all lecture-free. The labs contain rectangular group tables and whiteboard-painted walls (see below). Each group is assigned a laptop, which is stored in carts in the adjoining room.
In Purdue’s freshman engineering courses, boxes of project materials are assigned to each group, requiring a considerable amount of storage space. A lab assistant’s office was close by. Purdue also had classrooms with tables that could be arranged in many ways (below). These seemed less popular among the faculty that KU visitors spoke with.
Examples from Minnesota
The University of Minnesota has a new building dedicated to the Scale-Up model. The rooms include collaborative tables, multiple whiteboards and screens, and an instructor work station at the center of the room. Research at Minnesota has shown some success in increased learning and retention.
Minimum standards for redesigned classrooms

Because an active-learning classroom can mean many things, we suggest the university adopt minimum standards for redesigned rooms. These are general guidelines intended to improve atmosphere and student learning, and give classroom designers and administrators much leeway for experimentation.

- **Flexible seating** that can be arranged into collaborative groups but that allows for many options to suit different teaching and learning preferences.

- **Simple, intuitive technology** that allows instructors to push content to students and to groups, or to pull content from students or groups and share with the rest of a class.

- **Compact, movable lecterns or media cabinets** that allow instructors to face students rather than walls.

- **Whiteboards** on many walls to allow group work and demonstrations.

- **Larger number of power outlets** (in floors or at tables wherever possible).

- **Bright, visually pleasing rooms** with updated, pleasing finishes, window coverings, flooring and lighting.

- **Fast, dependable wi-fi** that can accommodate all the students in a room.

- **Tiered lecture halls**, preferably with two rows on each tier so that students can turn around and form groups with students sitting behind or in front of them.

Wherever possible

- **Tables and chairs of varying height** to allow students at the edges of rooms to see better.

- **Taller ceilings** to allow presentations above white board and to allow better viewing angles across a room.

- **A solid work bench and hooks in ceilings in large lecture halls** so that instructors in the sciences can attach experiments and material for demonstrations.
6. **Make better use of technology for learning**

We recommend several steps related to technology and instruction to improve and accelerate use of flipped, hybrid and online classes.

**Move toward a bring-your-own-device model**

Computers become obsolete in two to three years, and those in classrooms get relatively little use. Rather than continually spend money on desktop computers in classrooms, it would be more cost-effective to have faculty members take laptops to classrooms when they teach. Similarly, rather than buy desktop computers for labs, we recommend a bring-your-own-device model. This system, known as BYOD, has become increasingly common in K-12 schools and at universities. Moving to this system would require a few changes.

- **For students.** The university should set minimum specifications for hardware and software and offer phone and in-person support for university-specified machines.

- **For classrooms.** The university would no longer provide desktop computers in classrooms. Instead, faculty members would bring their own.

- **For labs.** In many cases, computer labs would be unnecessary, although we suggest experimenting with stations where students could hook up laptops to large monitors. Labs might also offer high-speed wired connections. This approach would allow for experimentation with lab design and create options for collaborative space for student work.

- **Software discounts and remote access.** Disciplines should identify critical software so that the university could negotiate volume discounts or site licenses.

- **Support.** A BYOD approach would require a different approach to computer support. The online help desk already does a good job of troubleshooting problems in many types of computers. This role would grow with a BYOD model. It would also require an in-person help desk where students could take their laptops for assistance. The university would need to determine the boundaries of that support, though.

- **Extended checkout.** Most students own laptops, but for those who can’t afford them we should offer an extended checkout. The libraries already provide laptops for checkout. An extended checkout might mean that students have access to a laptop during a semester, over breaks, or while their own laptop is being repaired.

**Expand use of remote access software**

Information Technology has been testing Citrix as a system for remote access to software, though the types of software available have been limited to titles like
Office that most people already own. The university should negotiate aggressively with software companies to provide access to the types of software that students and faculty need in teaching and research. This includes SPSS, ArcGIS and Adobe products, among others. Indiana University’s IUAnyWare program provides an excellent model for what could be done. It offers students, faculty and staff remote access to more than 50 types of software.

**Add videoconferencing capability to additional rooms**
Learning and scholarship increasingly require the ability to reach out to people around the world. Similarly, classes that have students at both the Edwards and Lawrence campuses need a reliable live connection between classrooms. The university has only two rooms – 1007 and 1009 Wescoe – with videoconferencing capability. We recommend adding to that number. This is an expensive addition (about $25,000), so the classrooms should be chosen for maximum impact.

**Add support staff for videoconferencing**
Reliable technology requires good support staff, so additional videoconferencing will require additional support staff to maintain. We also need to make sure that someone trained in videoconferencing is available for evening classes at both campuses.

**Stop the build-out of Echo360**
This technology was a poor investment. By simply recording lectures, it offers little incentive to faculty members to create shorter, more effective video lessons for students. We suggest that the university invest in other technologies that offer far more potential for creating video presentations that engage students and promote learning. Some recommendations are below.

**Create a faculty advisory group to work with Information Technology**
IT has done a better job in engaging faculty over the last couple of years, thanks largely to the efforts of Anne Madden Johnson and Ann Ermey, who is no longer at the University. In other cases, a lack of communication has led to poor decision-making in contracts for technology and services. For instance, the university joined iTunes U, but no one seemed to know why or how it would be used. Echo360 was installed in many classrooms even though it produces poor-quality video and promotes poor teaching practices.

A group known as the Teaching and Learning Technology Leadership Team could easily take on this advisory role. It was established in 2012 to advise the executive vice provost on matters related to teaching and technology but has largely become dormant because of confusion over its mission.

**Create a place for experimentation with technology**
This might be an experimental classroom or simply a sandbox lab. It would provide a place for testing new equipment and software, making recommendations, and keeping up with trends. Such a space is crucial so that
faculty and staff can experiment and test hardware and software that could improve teaching and learning.

**Negotiate site licenses for technologies that aid video creation and file sharing**
The university should negotiate site licenses for software that makes it easy for faculty members and students to create videos and interactive demonstrations on their computers, tablets and smartphones, and to easily share files with students. We recommend the following:

- **Camtasia Studio.** Screen recording software available for both PC and Mac.

- **Explain Everything.** A $3 app that allows screen recording, writing and voice on an iPad or an Android tablet. One of the benefits of Explain Everything is that it creates files that can be uploaded to Kaltura and used on Blackboard.

- **Free apps.** Several free apps provide similar capabilities but upload videos directly to an outside server and can’t be edited. These include Educreations, Knowmia and ScreenChomp.

- **File sharing and transfer.** IT has begun providing OneDrive storage for faculty and students, and we encourage quick adoption of such a service. Cloud storage sites like OneDrive, Dropbox and Box are the most convenient way to transfer videos and other materials from a mobile device to a PC or Mac for editing and upload. Their use is widespread among faculty members, despite admonitions from the privacy office, largely because the University had offered no storage options that match the convenience and ease of use of these services.

**Create a central site for online technology assistance**
Information Technology and the Center for Online and Distance Learning provide online and in-person assistance for Blackboard and other university-supported technology. In addition, CODL provides online and in-person assistance for faculty members creating online and hybrid courses. Over the last year, IT has revamped its help site for Blackboard and has been working at revamping its online help site for other technology.

IT is also working on a program called myCommunity, which would allow faculty members to join online communities at the university, including one that would focus on teaching with technology. We applaud this and see it as an opportunity to more easily share information and ideas.

To make it easier to find those services, we recommend creating a central portal with an easy-to-remember URL. This centralized site could link out to the variety of services available and would improve the university’s support capabilities. It
could also provide recommendations for choosing tools for preparing online videos and interactive presentations, including headphones, microphones, tablets and styluses.
Part 4: How do we determine the success of course redesign?

The success of course redesign will hinge on our ability to document learning within and across disciplines. This should begin with a thorough review of the goals and objectives of major curricula. Two central questions should guide this review:

1. What should graduates know and be able to do, and how can we demonstrate their understanding?
2. Are we succeeding in retention, progress, and timely completion of degrees?

The KU Core has already moved the University in this direction by creating a set of goals that transcend disciplines (e.g., critical thinking; communication; global awareness). Each discipline should follow up on these goals by identifying its own discipline-specific goals, along with ways of determining whether students have met these goals.

We recommend these specific steps at the University level:

- **Develop and promote ways to demonstrate learning gains** in content and skills, and coordinate with an overall University assessment plan.
- **Establish plans for course-by-course demonstration of achieving KU Core learning outcomes.** Encourage use of rubrics associated with KU Core. Develop a workable rotation of courses reporting assessment results.
- **Create models for best practices in documenting learning and make them public.** Follow the lead of the KU Core and create rubrics, checklists and other guidelines for determining effective teaching and student learning and success. These examples should also include attitude scales and student reported activities.
- **Create a repository of literature on course redesign and student learning and motivation.** This repository will provide examples of established tools and methods that can be used to help document the results of course transformation (e.g., concept inventories, the Wabash survey instruments, and the National Survey of Student Engagement). We should work with KU Libraries to create Creative Commons licenses for these types of materials.
- **Create a database of courses that embrace new approaches.** This will help University and departments know where to look to track the effects of course redesign on student learning and success. We should start with self-reporting of course redesign, along with interviews of chairs and directors. New low-cost observation methods (e.g., the COPUS, an observation protocol that can be completed by trained students on mobile
devices) could also be used to track the use of new teaching approaches. Added benefits of such a database are that it would help the university monitor the adoption of new courses, students find courses that best match their needs, and faculty members find examples of successful course redesign.

We recommend these specific steps in each school and department across the University:

- **Identify program learning goals.** Faculty in a department should identify shared learning goals, or the measurable skills and concepts that students should acquire before graduating from their program.

- **Create clear curriculum maps that track the expected development of key concepts and skills across courses.** These maps can draw on existing models created and tested by other departments.
  - Begin by identifying student-learning outcomes that are critical for student success both within the curriculum and after graduation.

- Identify the sequences of courses that can help students build to higher levels of learning on each outcome across the program. **Develop methods and measures to track student achievement of learning goals within courses and curricula.**
  - Identify measures and tools that capture students’ acquisition of key concepts and skills. Look to disciplinary organizations for national standards and assessment tools.
  - Collect early assessments within courses and track improvements in student understanding over time.
  - Collect baseline assessments or benchmarks of student learning prior to or in the early phases of redesign, and track changes over subsequent semesters.
  - Use mid-curricular assessments of student learning to gauge progress towards achieving goals for knowledge gained upon graduation

- **Use data analysis showing conditional probabilities and correlations among key concepts and skills within the curriculum map.**
  - Discover what concepts and skills are essential for success in downstream classes and the curriculum.
  - Determine whether lower-level courses are preparing students for learning in courses at the next level.
  - Make these discoveries available to department/school faculty to promote shared responsibility for student learning and improve the teaching and learning culture.

- Use OIRP data to study diverse populations and identify profiles of students who get the greatest benefit from redesigned courses
Use curriculum maps for pro-active advising and monitoring systems in support of success.

Curriculum maps and learning analytics provide a means to identify and pro-actively minimize hurdles and bottlenecks, and support students in the short term and advise faculty members in the longer term on course development. We have to track students who are in trouble, particularly early in their careers at KU. We also recommend that these procedures be used to:

- Develop a meaningful program advising model for students
- Decrease “sink-or-swim” cultures across certain programs (e.g., STEM)
- Increase achievement of disadvantaged learners
Appendix I

Glossary of terms used in this report

**Adaptive learning.** A computer-assisted approach to education that provides individualized instruction materials to students based on data about their performance. Those who master topics receive increasingly more challenging material and an opportunity to move through topics quickly if they choose. Those who struggle may receive remedial material that allows them to practice skills and better understand concepts before they attempt to move forward.

**Active learning.** A long-established approach to education in which students work hands-on with problems, questions and projects to gain skills and deepen their understanding of course material. Its opposite is passive learning, which emphasizes lecture and multiple-choice tests.

**Blended learning, blended classes.** These terms refer to classes in which many different activities take place at once depending on what students need and how they learn best. Some may work through adaptive learning modules on computers in the classroom or at home. Others may read or work in groups. Others meet individually or in groups with instructors. This approach is most common in K-12 education.

**C21.** A learning community at KU that focuses on course redesign. It provides workshops organized around the basic components of course design, allowing faculty members to work with colleagues on sustainable revisions of their instruction in an ongoing format.

**DFW rates.** The combined percentage of students in a class who withdraw or receive a D or an F.

**Evidence-based teaching practices.** These are instructional design and assessment methods that have been studied in formal, published educational research and found to produce more learning and more student success than appropriate control methods. The determination of best practice is based on formal evidence rather than on instructor preference or on local or disciplinary tradition.

**Learning analytics.** Data about student performance that instructors and administrators use to gauge success and make changes in everything from advising practices and other non-classroom activities to class size and approaches to teaching and learning. These analytics include such data as dropout and failure rates, student mastery of particular skills or in particular courses, class sizes and teaching techniques, and even how often students log into a learning management system.
**Flipped class.** An approach to teaching in which an instructor has students work through core materials outside the classroom and reviews students’ strengths and weaknesses before they come to class. Class time is then spent reviewing problem areas and working on individual and group activities that allow students to gain a deeper understanding of course material. Students generally spend the same amount of time in class as they would in any other course but use that time in a different way.

**Hybrid classes.** Uses much the same approach as a flipped class but relies more on online or out-of-class learning. Time in class is generally reduced.

**Reflective Practice or Teaching as Inquiry.** An approach to education in which instructors gather data and qualitative information about students’ learning and their own teaching practices, reflect on their work and make adjustments based on the evidence. This generally involves starting with techniques that others have found successful and then adapting those techniques to individual classes. Enhancement of learning is continuous, as all teaching includes gathering and analysis of evidence of learning, followed by revision of course materials and methods.
Appendix II

Largest classes at the University

Large lecture courses of all types are prime candidates for course redesign. According to statistics from the Office of Institutional Research and planning, 116 undergraduate courses have more than 100 students, and 279 have more than 50 students.

The largest courses, especially, offer prime opportunities for remake:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Class size</th>
<th>Redesign status</th>
</tr>
</thead>
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<tr>
<td>PSYC 104</td>
<td>General Psychology</td>
<td>980</td>
<td></td>
</tr>
<tr>
<td>CHEM 184</td>
<td>Foundations of Chem. 1</td>
<td>871</td>
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<tr>
<td>CHEM 130</td>
<td>General Chem. 1</td>
<td>862</td>
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</tr>
<tr>
<td>SOC 104</td>
<td>Elements of Sociology</td>
<td>810</td>
<td></td>
</tr>
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Appendix III

Research on Scale-Up Classrooms

The figures below are borrowed from a report on the quantitative measurements that have been made to illustrate the benefits of using the Scale-Up technique. Biechner’s research has shown marked increase in learning, as evidenced by pre- and post-exams in Scale-Up and traditional like-classes. Work at MIT has shown that the higher performers in the class gained the most from this method of instruction. The failure rates also decreased.

Fig. 5: The SCALE-UP class demonstrated better improvement in conceptual understanding than Lecture/Laboratory classes by achieving higher normalized gains for the Mechanics semester pre/post force and motion concept tests at Coastal Carolina University (CCU), North Carolina State University (NCSU), University of Central Florida (UCF), University of New Hampshire (UNH), and Rochester Institute of Technology (RIT). FCI is the Force Concept Inventory developed by Hestenes, et al. FMCE is the Force and Motion Conceptual Evaluation developed by Thornton and Sokoloff. The FCI national average is from Hake’s 6,000 student study comparing Interactive Engagement classes with traditional Lecture/Laboratory classes.

Fig. 7: Ratio of failure rate percentages for NCSU physics classes found by dividing the percentage of students failing in Lecture/laboratory sections divided by the percentage failing in SCALE-UP sections. Here, failing means receiving a grade lower than C – in the mechanics course or less than a D – in the E & M course, the grades needed to receive credit for taking the course. The Hispanic rate cannot be calculated because no Hispanic students have failed in an NCSU SCALE-UP section. Error bars represent standard error of the mean. More details are provided in Table 6.
Fig. 6: Students in the top third of their classes gained the most from the SCALE-UP experience in improving their conceptual understanding, possibly because they were teaching their peers. CSEM is the Conceptual Survey of Electricity & Magnetism developed by Maloney, et. al. ECCE is the Electric Circuit Conceptual Evaluation developed by Thornton and Sokoloff. The MIT E & M test was developed at MIT for their SCALE-UP implementation.
Appendix IV

Scheduling systems at other universities

**Iowa**

Allows users to view classrooms by type and by features, using drop-down menus and check boxes.

**Minnesota**

Allows users to view classrooms by choosing features from drop-down menus.
**Indiana University**

Allows users to view classrooms by choosing features from drop-down menus and check boxes with technology options.