

Teaching Matters

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Changing course formats challenges students and faculty

The adjustments in an active learning class can be difficult for students. As Catherine Sloan writes in *Change* magazine, millennials “have a deep fear of failure,” so getting them to take intellectual risks takes patience. Nor do they deal well with ambiguity. They like clear, firm solutions to academic problems, and pushing them to think beyond a single “right answer” also takes work from instructors.

Tradition has also made changing course formats challenging. Students have grown accustomed to sitting passively in lectures, reviewing instructors’ notes or slides posted online, attending study sessions (again, passively), cramming for exams, and moving on. Many resent having to take an active role in class—isn’t that the professor’s job?—and in their learning in general.

Even so, many students find the expectations of their professors lower than they had anticipated. Sloan writes that “the most common complaint we hear from students is not that their professors



Ying Xiong at C21 meeting. Photo Doug Ward

are too demanding but that they don’t hold firmly to deadlines and expectations.”

A lone instructor attempting to address these challenges would be easily overwhelmed. Plugging into a teaching community—whether it’s within a department, through CTE, or part of a disciplinary association—can help.

This issue of *Teaching Matters* includes information about various

resources available to KU faculty and instructional staff members. One notable option is C21, a group of individuals from across campus who share the goal of student-centered course transformation that moves students from a passive role in a classroom to an active learning orientation. You can learn more about C21 at cte.ku.edu/c21.

—Doug Ward & Judy Eddy

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What's old is new again

Andrea Greenhoot
CTE/Psychology

A meta-analysis of 225 studies published last summer in the Proceedings of the National Academy of Sciences found that compared to traditional lecturing, active learning strategies in science, technology, engineering and math courses predicted higher test scores (by half a letter grade) and 55% lower failure rates (Freeman et al, 2014). What's more, active learning appears to eliminate achievement gaps that are common for students from underrepresented groups such as minorities, women, and first-generation college students (e.g., Eddy & Hogan, 2014).

The overall approach is not all that new. After all, in the classic graduate seminar, students arrive prepared and class time is devoted to analysis, synthesis or application of ideas that they have already puzzled over. Some faculty, moreover, have employed similar techniques in their undergraduate classes for years. What is new is the application of these strategies to "content-heavy" or

very large classes, in which the traditional student activity has been listening, taking notes, and occasionally asking questions.

High enrollments, tiered classrooms and student expectations all create particular challenges for incorporating active learning. Based on the experiences of faculty at KU and elsewhere, we have made great progress in understanding how to feasibly implement active learning, even in these situations.

The teaching featured in this newsletter reveals a core principle of active learning: don't do for your students what they can do, and learn from, themselves. Instead of looking at teaching as the transfer of knowledge from expert to novice, you can actively engage students in the process of learning through reading, writing, problem solving, exploring or discussing. To integrate and increase the quality of active learning, students are responsible for preparing and becoming familiar with material before meeting face-to-face.

KU faculty have used all sorts of strategies to ensure student preparation, including simple social accountability (unprepared students stand out to the teacher or their group); completing online reading quizzes; writing in discussion boards, blogs or journals about pre-class material; or other "proof of preparation" during class time. Some of these activities are appropriate for large classes and some for small classes. The key is to be sure that the pre-class assignments are well aligned with what your students will be doing when they arrive in the classroom. (See the box at right for more advice for implementing active learning, as well as page 8 for a list of active learning strategies.)

Last fall I was introduced to a new faculty member who had met a colleague at a disciplinary conference, and both of them were teaching a similar course. The two faculty members set up an online dropbox and now share syllabi, assignments and other course material across the two campuses. KU is part of other more systematic efforts, as well. CTE's Collaborative Humanities Redesign Project connects KU faculty who are incorporating active learning with faculty at three other institutions. The Bay View Alliance,

"Active learning strategies ... predicted higher test scores (by half a letter grade) and 55% lower failure rates."

which is composed of nine research universities, enables instructors who are transforming very large courses to consult with colleagues within the network.

These are just a few examples of the benefits of collaborating with peers on teaching. It can take many forms, from simply talking with colleagues about how they've made active learning work all the way up to team teaching (see page 7). Dividing the work of developing in-class activities reduces the amount of time needed to prepare a lecture—which takes us back to the PNAS

meta-analysis. We can make the best use of our time for teaching, and significantly improve students' learning, by incorporating active learning.

References

Freeman et al. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences of the United States of America*. Retrieved from <http://bit.ly/1Aow03W>

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News In Brief

The **Bernstein Award for Future Faculty** recognizes a KU graduate student who has approached her or his teaching as inquiry into learning. The award will honor a graduate student who is nearing the end of a doctoral degree and who will pursue a career in academia. One \$500 award will be made this spring. More information about eligibility and the application process is posted at cte.ku.edu/bernstein-award-future-faculty. Applications are due April 20.

The award was established in 2014 in honor of Dan Bernstein, who served as CTE's director for 12 years. To contribute to this fund, go to www.kuendowment.org/cte

Department Teaching Grant applications are due March 23. CTE is offering \$5,000 grants (with potential for renewal) to units/departments to develop teaching initiatives at the undergraduate or graduate level. The call can be found at cte.ku.edu/cte-department-teaching-grants

Best Practices Institute applications are also due March 23. BPI is a hands-on seminar for teachers who want to reflect on and learn to represent their teaching. Each participant will receive a \$1,000 instructional fund. Applications are posted online at cte.ku.edu/best-practices-institute

Six strategies for implementing active learning

- 1. Start small.** Focus on one thing you want to change, or experiment with a new strategy for a unit or two, before redesigning an entire course around it.
- 2. Be goal directed.** If you take time to plan, you will be more efficient in the long run. Identify what you want students to be able to do, and focus your new approach/assignment around helping students achieve that goal. This strategy will also make it easier to gauge whether the new approach worked.
- 3. Prepare students.** If students are ready to do something meaningful during class time, then active learning won't resemble "busy work." The point of implementing active learning into class time is to allow the instructor to work with students and coach them through difficult course material. Activities need to be challenging enough to engage students, and students need to see why they are completing the activity with peers and under the instructor's guidance.
- 4. Shape expectations, early and often.** Particularly in large classes, students often expect that they will be talked to, rather than being part of a dialogue, and they believe that the role of the teacher is telling. If you contradict those expectations, make it clear to students what you will be doing differently and why, starting the first day of class, with reminders throughout the semester.
- 5. Provide a structure that helps motivate students.** Blending the following three factors generally produces the best results: have activities contribute directly or indirectly to grades; establish a level of social accountability; and be certain that the work is meaningful, whether it relates directly to course material or is a topic students find interesting.
- 6. Look for opportunities to collaborate,** on campus and beyond.

Teaching collaboration: Five KU teachers share their experiences

Rebekah Taussig
CTE/English

This spring, I had the opportunity to talk with five teachers about the role that collaboration has played in their work. Some of these teachers participate in the C21 working group that CTE sponsors (see cte.ku.edu/c21). Others rely on colleagues within their department. In all cases, they believe that collaboration has helped them develop high-end courses that have resulted in deep student learning.

David Weis, Chemistry

After being inspired by several CTE discussions, I have flipped two classes: an advanced, junior/senior-level chemistry course for majors and an introductory chemistry course for non-majors. I used to rely entirely on lectures, and by the end of the semester, attendance was usually quite low.

Since redesigning these courses, students are much more engaged.

They now read and take short quizzes outside of class, reserving more time in class for answering questions and interactive worksheet activities. One of the benefits of this redesign in the intro classes is more effectively inviting students into the discourse. At the advanced level, there appears to be higher retention, and students can focus more on conceptual ideas than vocabulary. Many students wrote in their teaching evaluations that they wished all of their chemistry classes were taught this way.

The work to flip these classes was enormous, because I had to rework every single classroom event. I was committed to making these changes, however, because I was persuaded by the data and studies that people were showing me, and now I have seen tangible and compelling results in my own classrooms.

“...I was persuaded by the data and studies that people were showing me, and now I have seen tangible and compelling results in my own classrooms.” —David Weis

Kathryn Conrad, English

One of the things born from collaboration with other faculty is that we are reminded of why we are here. A particular strength of KU is that, while we practice a wise and mindful use of tools, our focus is on people and human connections among students and teachers. Our university cultivates intellectual community that allows for connections that are essential to deep and lasting learning. This is something I have experienced in collaboration with my peers and the thing I try to replicate for my students.

One of the exciting things to do in the classroom is identify the interests students have in common and help them to build their own intellectual learning communities. These are connections that could eventually lead to collaboration on a project or even, at the graduate level, an article or a conference presentation. One of the benefits we have seen, and recent publications affirm, is that what really drives learning is these interpersonal connections. It's the human connections that drive investment and interest and passion and enrich people's lives in palpable ways. Collaboration and community are essential, and the classroom invites that conversation.

Brad Williamson, Center for STEM Learning

In my almost 40 years of teaching, I've always prioritized student-centered, interactive learning. Last semester I helped teach an Introduction to Biology class for non-majors with nearly 900 students. My co-teacher and I were able to collaborate on ways to invite interactive learning experiences into this class. Typically these classes are not taught interactively, because people are afraid they are going to lose control of such a large crowd of students. It is particularly intimidating to implement these types of changes on your own, but our collaboration provides an empowering support system.

Rather than relying on lectures, now we almost always integrate some kind of interactive element into class periods. For example, students were assigned to bring their first written inquiry report to class. I had them transform their write-up into a mini-poster presentation, which they presented to surrounding small groups. Students repeated their presentations several times to different groups, all of whom provided feedback.

Maximizing the amount of time that students can talk with each other to work out a problem is critical to learning, and we have seen how this is possible, even in a large classroom setting.

Emma Scioli, Classics

I participate in C21 and am also a member of the Course Redesign in the Humanities Project. At a very fundamental level, this type of collaboration has inspired me to continually reflect on my teaching and course design. It's an ongoing dialogue.

For example, I attended the first and last meetings of C21 last fall. In the first session, I ran a small round-table discussion about a series of new, scaffolded critical-thinking exercises I was excited to implement in my mythology course. By the last C21 session, I had finished teaching the course and was in the process of reflecting on the experience. Instead of remaining stagnant with changes I had made to the class, the session provoked a fresh insight into the grading system I had in place and inspired a new way of thinking about how I communicate point value to students.

This experience highlighted to me that participating in these kinds of collaborative approaches to teaching invites continual reflection and inspires flashes of insight. Being able to vocalize your teaching reflections to others and receive feedback allows you to think of things you wouldn't necessarily have thought of on your own. Your teaching is an ongoing process, and your reflections on your teaching should be the same.

Bozenna Pasik-Duncan, Mathematics

I have taught for over 40 years, but I am still learning so much. My participation in C21 is connected very much to my teaching philosophy. I promote 5Cs: collaboration, communication, connections, creativity and curiosity.

In Fall 2013, I taught a 500-student Engineering Calculus I class. One particular success was inviting the GTAs into all of the lectures, cultivating collaboration and communication. I assigned GTAs to different sections of the 500 students, which created smaller collaborative groups. This allowed students to have an instructor close by to answer questions, and also provided the GTAs practical hands-on training as mathematics teachers.

In addition, I started a peer-tutoring program in the course when I saw that 25% of the students were too advanced for the class, and 25% were not ready for it. We didn't say it was the "best" students assisting the "worst" students. Instead, we identified that at that particular moment in time, there were some students who were in need of help, and others who could offer that help.

This aligns with the ideas that C21 promotes: engagement, communication, connections, collaboration and an exchange of ideas. Mathematics is often a quiet pursuit, but in that class my students were talking with one another, building a community of learners. It was gorgeous.

Why change our approach to teaching?

Doug Ward

CTE/Journalism & Mass Communications

Jennifer Roberts first noticed the difference a few years ago. Her Geology 101 course regularly draws over 300 students a semester, and Roberts, an associate professor of geology, was teaching much the same way she had since she took over the course in 2002: lecture and exam.

Problem was, exam scores were dropping, and as she interacted with students, she found that they had less understanding of the material than students had had just two or three years before.

So Roberts set out to transform the class, which is now called *The Way the Earth Works*, into an active learning format, with in-class group work, student presentations, clicker questions to prompt discussions, and lots of interactions with students. With the help of Kelsey Bitting, a postdoctoral teaching fellow, she began moving away from what Bitting calls the “fire-hose approach” to teaching, to concentrating on helping students learn core skills through hands-on activities.

Research has long cast doubt on the use of lecture in education. Donald Bligh, in his book *What's the Use of Lecture?*, provides some compelling evidence, reviewing more than 200 courses in several

disciplines. The biggest benefit of lecture is that it is an efficient means of reaching a number of students in a single setting. Bligh argues that lectures can be useful in conveying information, but that they do little to promote thought or problem-solving, or to change behavior. Rather, they reinforce ideas, values and habits that students have already accepted.



Jennifer Roberts (r). Photo Doug Ward

Despite the evidence about lecture's weaknesses, two-thirds to three-quarters of faculty members continue to rely it, according to research summarized by Derek Bok in *Our Underachieving Colleges*.

Bitting urges instructors to think about it this way: “You may have a lecture that works to get students to take a multiple choice test really effectively,” she said. “But when you have a conversation with that student after the semester, they may not actually remember anything. Or they may

not know how to make sense of it outside of the context of the little paragraph in the textbook where they read it the first time.”

Transforming a class, especially a large lecture class, isn't easy. Roberts has essentially applied the scientific method to teaching Geology 101, experimenting with various techniques. Some have failed; others have succeeded.

“There has been a lot of struggle but also self-reflection on my process and the learning process in general,” she said.

Roberts said her experience with active learning in a large class had forced her to step back and recognize that students “are not me.”

“They don't learn like I do,” she said. “And that's

OK. But my job is to have them learn, so I need to think about what's the best way to have everybody do the best they can and to learn.”

Bitting also urges instructors to look more broadly at student learning.

“Even if your lecture is working well for getting your students to take a multiple choice test, if they're not excited about it and they don't care about it when they leave, maybe you're not doing the job you want to do,” she said.

Rethinking course design across campus

Chris Haufler, Ecology & Evolutionary Biology
with Rebekah Taussig, English/CTE

As the Dean's Project Leader for Educational Innovation, I am trying to promote visibility of course design and its value across many disciplines. I'm learning that the process and result of designing courses can be quite different, depending on the specific discipline, but there are a few core ideas I am promoting across campus.

This semester, I removed the word "lecture" from my syllabus. Instead, I refer to "class activities," "presentations," and "group activities," so students have a sense of the broader dimensions of this as a complete experience. I have discovered that there are still times when I need to cover information in a way that resembles a lecture, but I'm trying to limit that to short presentations rather than a full class period.

I also prioritize helping faculty become more aware of the capabilities of and resources available to contemporary students. Students have more direct and easy access to knowledge and facts now than ever before, yet they may not have a better sense of how to interpret that knowledge and those facts. It may be that we now have a greater responsibility to place more emphasis on concepts and skills than on knowledge and facts.

There are a few different ways in which I am building teaching

communities to cultivate this kind of thinking. We have a CLAS focus group that is exploring innovative approaches to course design across different disciplines, as well as comparing what is going on in other institutions. Members include a diverse group from the sciences, humanities and fine arts. We're just beginning our conversation, but there's value in simply sharing the successes that we've had and seeing how broad and deep they are right here on our campus.

I am also building a one-stop website "tool kit" to engage interested faculty members in thinking about resources that are available to enhance their teaching methods, as well as give them some context to what we mean by "course design." There are really remarkable comparative studies being published on different teaching methods and the value of them (for example, Freeman et al. at <http://bit.ly/1Aow03W>). Learning about these can motivate innovation.

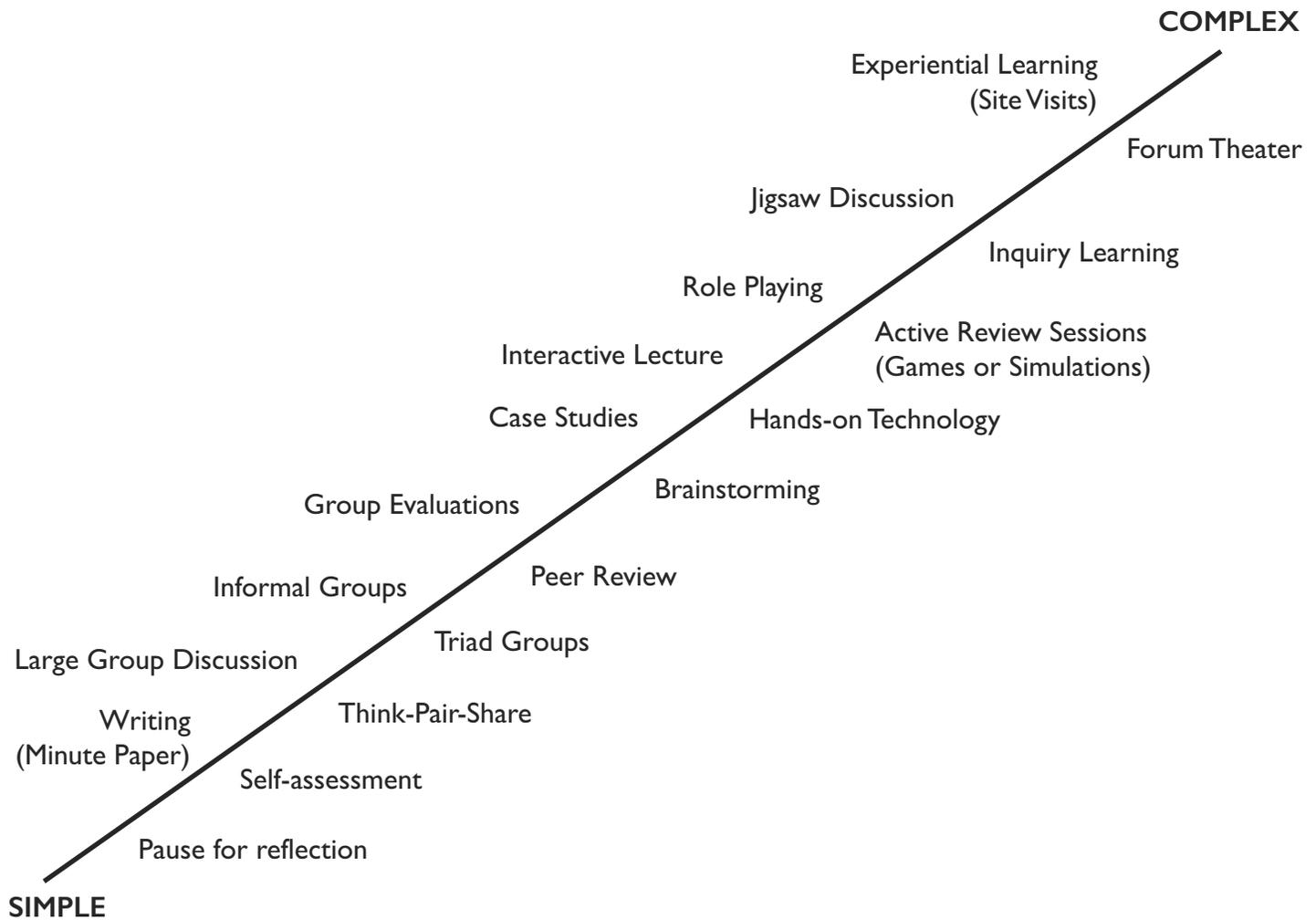
From a visiting scholar who had transformed an introductory physics class at the University of

Illinois I discovered this: In some disciplines, the biggest hurdle to incorporating and embracing new methodology and a more active approach to learning is doing the work as a team. It's about transitioning from "my" course to "our" course. Especially in introductory classes, the true teamwork approach is not as common as it should be, and faculty members who teach the classes include different content and use a variety of approaches.

Although there are reasonable arguments for encouraging different teaching styles, especially for students in courses that launch the curriculum for major disciplines, such variation across sections of the same course can be detrimental for students. At the University of Illinois, once they got people to understand the value of a team approach to learning, the ideas started bouncing in. Everybody was involved and worked together as a team. In my experience, this type of collaboration is vital to engaging our students and ensuring our continued success as an institution.

"It may be that we now have a greater responsibility to place more emphasis on concepts and skills than on knowledge and facts."

Nineteen active learning strategies, simple to complex



A spectrum of active learning strategies arranged by complexity and classroom time commitment

Prepared by Chris O'Neal and Tershia Pinder-Grover, Center for Research on Learning and Teaching, Univ. of Michigan. Retrieved from http://www.crlt.umich.edu/sites/default/files/resource_files/Active%20Learning%20Continuum.pdf

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