Teaching Matters

News & Information from CTE

The future of human learning depends on human interaction

The Center for Teaching Excellence kicked off the fall semester with the annual Teaching Summit, which focused on Teaching the Whole Student. As the semester ends, we are looping back to that theme in this issue of *Teaching Matters.*

A recent article by Randy Bass in *Change* magazine explores the importance of this topic. Bass looks at connections between technology and learning and the drivers of higher education innovation. He suggests that higher education reapportion resources to increase student engagement, empowerment, and human relationships.

Bass concludes, "Advances in technology and learning should be celebrated not because they allow us to reach more people with fewer resources in order to achieve minimal expectations, but, in addition to having the tools and knowledge to raise our expectations for fundamental professional practice, we can now engage in that most human of all capacities: creating a future we couldn't otherwise imagine" (The impact of technology on the future of human learning, p. 39).

In the following pages, you can read about ways that KU faculty are creating that future.

COMING UP

FACULTY READING GROUP

Ever wonder why students do poorly on their first assignment in your class, even though they passed the prerequisite course and should know the material?

If you have experienced something like this, consider joining CTE's reading group on Understanding How Students Learn. Participants will discover how to apply the science of learning to their teaching. A new group is starting in Spring 2019. Contact Judy Eddy at jeddy@ku.edu for details.

IN THIS ISSUE

Keeping sight of humanity in learning

Andrea Follmer Greenhoot, CTE

What do we do as teachers when the widespread availability of information and new technologies threatens to replace many of our traditional roles?

That's a question Robin Wright, professor of biological sciences at the University of Minnesota, asked during her keynote address earlier this year at our annual Teaching Summit.

Wright quickly answered her own question by saying she is not that concerned about human teachers becoming obsolete; while technology has changed the tools available for teaching, the fundamental qualities of humans as learners have changed very little. Our growing understanding of those qualities, through advances in learning science, educational research, and the scholarship of teaching and learning, enables us to create much more powerful learning experiences for our students than ever before. Wright distilled the lessons from this literature into five broad principles. Each of these lessons can be readily applied to teaching, as illustrated by some of the recent pedagogical innovations of our KU colleagues:

Every brain is different. Each student brings a unique combination of experience, skills, knowledge, and attitudes to our classrooms, and those variations have implications for the way they understand course material and engage with courses. We can't create individual courses for each student, but we can use teaching strategies that support meaningful and accessible learning for all students, regardless of their background or identity. For instance, frequent low-stakes assignments completed out of class, such as reflective writing, reading quizzes or problem sets, and in-class activities such as small group discussions or clicker questions can reveal the range of understanding that students bring to course material.

We can also create an inclusive climate to support the wide range of student needs. These practices are central to the course design work of participants in CTE's Diversity Scholars program. Diversity Scholar Andrew Denning, history department, increased the transparency of course and assignment goals in his European history class. To improve students' understanding of what is involved in historical thinking, he added a series of staged, scaffolded assignments to help them practice and build their historical thinking skills, and integrated more issues of contemporary relevance into the course to more equitably engage students' interests.

The person who does the work does the learning. Decades of research shows that memory and comprehension are enhanced by methods that evoke deeper processing and more active engagement for the learner than listening alone. One straightforward way to approach this principle to teaching is to consider what you are doing for your students that they could be doing, and learning from, themselves.

Aimee Wilson of the humanities department did just that when rethinking the design of her Pregnancy in Modern Literature course. She used to prompt discussions of the readings by identifying key passages and explaining their significance to the students. This fall, she incorporated a series of informal in-class writing assignments that asked students to explain the significance of key passages, supported by

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an annotation worksheet that guided them through the process. With new opportunities for students to do the work of text explication themselves, they showed stronger close reading skills on exams.

You can only make new memories by connecting them to older memories. In other words, learning is much more successful when students can link new material to their existing knowledge and relate to it personally and practically. What can we do if students have limited prior knowledge and experience with a course topic? M'Balia Thomas, curriculum and teaching, recognized this challenge in her course on instructional approaches to teaching English to speakers of other languages (TESOL). She turned to a topic that was already familiar to many of her students: Harry Potter. Using video clips from the series, she created analogies that linked new theoretical and field-specific concepts in TESOL to ideas embedded in Harry Potter. She found that the approach boosted both student engagement and grasp of TESOL concepts.

Sometimes understanding that can anchor new learning is acquired through students' previous coursework. Yet students often fail to recognize the relevance of knowledge acquired in other courses, and even when they do they may struggle to see how to apply it in new contexts. A recent collaboration between a team of KU physics and chemistry instructors provides a terrific illustration of strategies that effectively promote the transfer of skills and knowledge from one course to another. Jennifer Delgado, Sarah Rush, Drew Vartia, Elizabeth Grotemeyer and Chris Fischer have developed course modules that help students activate familiar mathematical knowledge and then explicitly connect it to physics and chemistry problems with which they are less familiar. The results of a pilot implementation in physics are quite promising, as the module is producing significant gains in students' abilities to solve math-based physics problems.

People almost always learn better when they work together. Learning collaboratively enables students to learn from and capitalize on each other's knowledge, resources, skills, and perspectives. Many KU faculty have put this principle into practice by reorganizing classes around various forms of group work and team-based learning.

A particularly dramatic illustration comes from David Johnson, electrical engineering and computer science, and Molly McVey, engineering, who transformed David's digital logic course so that students spend 100% of class time working in small groups to solve problems and discuss theory. Compared with the previous lecture-based offering of the course, the redesigned version has resulted in significant learning gains on most course learning objectives. These gains would not have occurred without students' collaboration.

Making memories requires repetition, feedback, elaboration, and sleep. The inclusion of sleep in this list may be surprising, but sleep helps strengthen the memories learners form throughout a day and connect them to other memories. What this means is that learning can best be achieved through cycles of practice, feedback, and elaboration.

Jennifer Harrison's reworking of her business law course on negotiations provides a good example of this principle. A central course goal is for students to develop skill, comfort and confidence in negotiating and applying negotiation theories. To achieve this, she redesigned the course around weekly cycles of preparing for a negotiation, simulating the negotiation, and reflecting on feedback, with students refining each weekly cycle based on their increasing knowledge and experience. That combination of repetition, feedback, and elaboration—combined with opportunities to "sleep on it"—has led to improvements in students' performance in simulations, particularly in their ability to find creative solutions that are not always obvious from the fact patterns. Students also report increased confidence and comfort in negotiating practice.

These are just a few examples of the kinds of powerful learning experiences our KU colleagues have developed. Deepening our understanding of learning and sharing ways we implement that knowledge will help us continue to grow in our role as teachers.

Making online classes more personal

Doug Ward, CTE

When I talk with instructors about online teaching, one of the first things that comes up is the lack of personal interaction.

That's understandable. Teaching is usually associated with being physically present with students. Most instructors enjoy that social aspect, and many have trouble imagining teaching any other way.

When I hear those doubts, though, I try to explain what online teaching is really like—or what it can be like. I often get to know my online students better—or at least a wider range of them—than the students in my physical classes. I'm certainly not alone in that regard. In an Online Working Group I lead at CTE, we often talk about ways of making our classes more personal and, as a result, motivating students and helping them learn.

That engagement and interaction doesn't just happen on its own. You can't just take an in-person class, stuff it into Blackboard and expect it to work. You have to think deliberately about ways of creating interaction and adding personal touches that engage students and make them feel part of a class. No one element provides that. Some instructors like to meet live with students via Zoom or Skype, or to hold online office hours. I frequently talk with students by phone to work through questions or to provide guidance. Here are other examples from my teaching and the Online Working Group:

Introductory video. A short welcome video introduces students to a class and allows students see the person behind the course. Susan Marshall, an instructor in psychology, explains it this way: "Making a welcome video seems somewhat unnecessary from a course content perspective but it can go a long way toward students seeing you as an approachable, real-life person."

Class introductions. Have each student create a short profile that remains available throughout the class. Ali Brox, an instructor in environmental studies, uses VoiceThread, a tool that allows students to create short videos with a webcam. She prompts them with questions she often asks in her in-person classes: What is your name? Your major? Where are you from? Why are you taking this class? I usually have students write profiles, and I sometimes use prompts related to course material. For instance, in a recent class on data collection, I used a prompt I borrowed from Carmen Orth-Alfie at KU Libraries, asking students to choose a quote about data and explain why that quote had meaning for them.

Individual correspondence. I reach out to each student individually and welcome them to the class, something I picked up from Sean Smith, a professor in special education. I try to reference some element from the profiles they create so they know that I've read about them. Students are sometimes surprised when I do that, and they thank me for reaching out individually. I sometimes have students do something similar, choosing three others with similar interests (based on the profiles) and introduce themselves to those colleagues.

Weekly updates. Lack of a specific meeting time can make a class feel amorphous. To provide some structure, I email students each Monday and provide an overview of what we will be doing in class that week. I include synopses of interesting things I've been reading or that relate to the class, keeping the message light and trying to make it something students want to read.

Discussion boards. These provide interaction each week and help students think through course material. I keep discussion groups to six or eight students. That is small enough that students get to know each other but large enough to provide various viewpoints. To help students approach discussions from different perspectives, I assign roles. These include discussion leader, devil's advocate (who points out flaws or brings in alternative viewpoints),

Caminero-Santangelo and Lyles provide leadership in teaching at KU and beyond

Marta Caminero-Santangelo, director of Latin American and Caribbean Studies and professor of English, helped establish CTE's Diversity Scholars program in 2016 (see cte.ku.edu/diversity-and-inclusion-projects). For the last three years, she has co-led that program with Darren Canady, Department of English, and Shannon Portillo, School of Public Affairs and Administration.

"Marta has been instrumental in helping CTE develop its programming on inclusive teaching strategies," said CTE director Andrea Follmer Greenhoot. "I have also very much appreciated her efforts to help faculty colleagues identify ways to support student populations that are particularly vulnerable in the current political climate, such as undocumented/DACA students."

Caminero-Santangelo often leads sessions at the Teaching Summit and new GTA orientation, and she served as a CTE Faculty Fellow from 2015 to 2017. Other contributions include her teaching e-poster "Backwards Design for Long-Term Outcomes," (see cte.ku.edu/backwards-design-long- term-outcomes—marta-caminero-santangelo) in CTE's online gallery, and her work as an advisory board member.

Marta Caminero-Santangelo

Ward Lyles

Ward Lyles, assistant professor of urban planning, is a prominent departmental Ambassador to CTE. He frequently leads sessions at the annual Teaching Summit and new GTA orientation, as well as workshops at the Center. He has been a key voice for using team-based learning, as well as an active participant in Diversity Scholars. His DEI e-portfolio, "Diversity, Equity, Inclusion, and Compassion in a Quantitative Methods Class" (cte.ku.edu/diversity-equity-inclusion-and-compassion-quantitative-methods-class—ward-lyles-2018) summarizes his work to engage graduate students and build their confidence and competence in a research design and statistics course.

This course led to recognition at the national level. Last summer Lyles received an innovation award from the Association of Collegiate Schools of Planning and the Lincoln Institute of Land Policy. The award was one of three given to U.S. educators who developed courses to prepare future planners to solve economic, social and environmental challenges. The winning courses, including Lyles's, serve as models for urban planning faculty across the country.

The method of multiple working hypotheses in teaching and learning

Bob Goldstein, Geology

T. C. Chamberlin, geoscientist and former president of the University of Wisconsin and the American Association for the Advancement of Science, published an article in *Science* in 1890 about the method of multiple working hypotheses. In essence, he argued against using a ruling theory or single hypothesis in science, teaching, and everyday life, as that approach restricts observations to only those that support a single idea, which may be the wrong idea or only part of the explanation for a phenomenon. He made the point that, alternatively, if an individual creates multiple hypotheses, explanations, or approaches, no single one becomes the favorite, and the mind is free to explore which ones are possible and which ones are false. The implementation of this method of scientific logic in the classroom and lab is one of the most effective learning tools we have. It allows students to create something on their own, do the hard mental work to figure out how to solve problems, and acquire an emotional response for having done it. Sometimes the process is fraught with difficulty, stress and conflict, and that helps learning too!

Discover and create

As an example, the most effective learning experience for most geology undergraduate students is their field camp. Typically, students are released into a field area and challenged with determining its geologic history. They must make and record their own observations, develop hypotheses, figure out how to test those hypotheses on the fly, and gather the data to support or disprove multiple possibilities. Imagine what that feels like: scary, physically challenging, and definitely engaging! Students walk up to a mountainside, make an initial observation on an outcropping of rock, and suddenly, a slew of possible explanations come to their mind, all testable by seeking certain other observations that can be made simply by climbing over the next ridge to see what is there.

That process of formulating possible explanations and tests is a creative one. Students own it, and therefore, it reinforces learning. Students have strong motivation to get over the ridge to see which of their creations survive and which are falsified. There is the eager anticipation of what they will see, physical stress of climbing (and not falling), and then the aha! moment when they discover which hypotheses are wrong and which remain. There is a psychological payoff there that makes students want to do the same hard work all over again to solve another problem, making them junkies for discovery and learning.

Promote constructive conflict

In some of my favorite geology lab classes, we present students with a particularly interesting rock specimen or field exposure, and ask them a series of questions to hone their observation skills. Once they have made those observations, they are then asked to make an argument for the explanation. Typically, various students in the class come up with different ex-

planations and observations, which don't always agree. We then review the results as an entire class; the differing results are shared with the class and presented as multiple working hypotheses. We form teams, with the data (rocks) available for a second look. The class members immediately see alternative explanations that they had not thought of, and the debate that ensues is rousing and sometimes emotional. In the end, sometimes multiple explanations remain, or others are disproven by an observation brought up by class members or the instructor.

Students look forward to these debates and learn that it is OK to create hypotheses that are proven wrong, and that learning is an active process that requires creativity, critical analysis and debate. The most exciting result is when there is a maverick hypothesis from a student that proves my own interpretations and those of the rest of the students wrong. Creating hypotheses and tests, engaging in active

group argument and encountering emotions connected to supporting their hypotheses, and experiencing the psychological impact that comes from having hypotheses survive or not survive all contribute to students' learning.

Sure, T.C. Chamberlin was a geoscientist, born way back in 1843, but his approach to scientific reasoning can be applied broadly today in the classroom and lab to help our students excel.

Editor's note: For 20 years, CTE published a collection of essays titled *Reflections from the Classroom* each spring. In response to changes in readership and Center priorities, *Reflections* will no longer be a separate publication. Instead, each issue of *Teaching Matters* will feature an essay by a notable faculty member. Thanks to CTE advisory board member Bob Goldstein for contributing his essay this issue.

Making online classes more personal (continued from p. 4)

synthesizer (who ties discussions to previous course material), and lurker (who visits other group discussions and shares what those groups are doing).

Podcasts and videos. Video can be a good way to reach students, as long as it is brief (five to 10 minutes) and on point. Videos are best when you need to show something visually. Those in which an instructor talks in front of a camera provide little incentive to watch. I use some video, but I have switched mostly to podcasts. I have been primarily teaching master's classes online, and students like being able to listen in their cars or when they have a few free minutes at home. Relatedly, I like to use audio for grading. That allows students hear me talk to them about their work, adding another element of personalization.

Instant messaging. Perhaps the most important thing I have done in my online classes is to adopt Slack, a team messaging platform. That's where we have class discussions and where students can ask questions and share interesting material they have

found. Slack allows me to create groups or whole-class message boards, and to create bots for gathering information or for monitoring material. It also allows students and me to message each other individually. Slack cuts down on email and allows me to communicate with students more quickly. It's not perfect. The biggest drawback is that the university does not provide technical support, so I have to help students learn to use the platform. The biggest advantage, though, is that it takes class communication into a space that feels more natural to students.

That's hardly an exhaustive list, but it provides a few examples of how student-centered learning can work online. Yes, teaching online is different from teaching in person. With some thought and planning, though, it can be just as personal and interactive.

Gallery snapshots

The faculty and instructional staff members listed below have recently published a portfolio or poster in CTE's Gallery. For full details about each teaching project, check the links posted.

Ryan Funk: Facilitating Learning through Case-based Exercises in Pharmacy Practice
Funk shares the results of an experimental integration of group learning through case-based exercises. It showed improved learning through in-class group exercises and demonstrated the ability to document active learning exercises in a large class format with a web-based classroom response system.
cte.ku.edu/facilitating-group-learning-through-case-based-exercises-pharmacy-practice-curriculum—funk

Learning Module Structure

· Pre-class video webcast
· Pre-class reading material
· In-class quiz on pre-class material
· Lecture
· Case-based questions, alone and
  in groups

Rémy Lequesne: Incorporating Writing into an Engineering Course
Lequesne incorporated a writing component in a civil engineering course, giving graduate students practice communicating their ideas on a technical topic.
cte.ku.edu/incorporating-writing-into-an-engineering-course-lequesne#summary

Sarah Robins: Engagement in a Large Lecture Course: Using Technology and Oral Evaluation to Invite Students into Conversation
Robins redesigned a large, introductory-level philosophy course to engage students with the online tool VoiceThread, along with the traditional philosophical practice of oral communication and argument.
cte.ku.edu/student-engagement-large-lecture-course-using-technology-and-oral-evaluation-invite-more-students

Irina Six: "Learning by Doing" in Post-Soviet Communication: From Reading and Lecturing to Interviewing and Examining
Six shares new ways to present content and address changes in the political climate between the U.S. and Russia by using out-of-class time more effectively and in-class time to increase students' interest in material.
cte.ku.edu/"learning-doing"-post-soviet-communication-reading-and-lecturing-interviewing-and-examining—irina

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Teaching Matters is published by CTE and edited by Judy Eddy. We welcome your comments and suggestions.