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Hello S&T faculty and welcome to another edition of the CERTI newsletter, dedicated to celebrating excellence in the classroom. In this issue, you'll find articles on a unique method for students to ask [questions](#) and how to make history a [hands-on](#) learning experience. Also, here are tips from the [Curators' Teaching Professors](#) on working toward balance in your career.



**CERTI
NEWSLETTER**
Center for Educational
Research and Teaching
Innovation at Missouri S&T

Chem Professor Encourages His Students to Do *What?*

It's a scenario sure to irritate even the most good-natured college instructor: Students surreptitiously texting their friends, family or other students while the instructor's carefully constructed lesson is being presented. Half-distracted students are not only missing material, but their lack of attention can be construed as downright rude. No wonder some instructors want to ban cell phones from their classrooms altogether.

One chemistry professor at Missouri S&T, though, not only encourages the practice in his class, he includes it as part of the recommendations on his syllabus. Under the "Maximize Your Studies: Ask Questions" section of Klaus Woelk's syllabus, these points are listed: "Be specific," "Keep your hand up," "Politely interrupt" and ... "Texting."

He asks his students to do *what?*

Woelk, associate professor and assistant chair of the chemistry department, has taught Chemistry 1 to mostly freshman S&T students for the past seven years. The large (150-200 students), diverse group is comprised of engineering, chemistry, non-science and undeclared majors.

In Fall 2009, he decided to ask his students to text him messages during his lectures.

"When you have a large class, they just don't talk to you," Woelk says. "What I noticed at the beginning of the semester was that they have a lot of questions, but no hand signals." That was disturbing to him, knowing that student-faculty contact is one of the keys to student motivation and learning.

Inspired by a TV news talk show host, who shows viewer email comments at the end of every program, as well as from a newspaper article about a pastor who allowed church visitors to text questions about his sermon, Woelk decided to experiment with students texting him their questions and comments during class.

When Woelk explained about his communication system, his students were



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CONTACT US CERTI

<http://certi.mst.edu>

573-341-7648

207 Norwood Hall
Rolla, MO 65409

Director: [Dr. Harvest Collier](#)

Editor: [Diane Hagni](#)

(Go [here](#) to view previous newsletters)

DID YOU KNOW?

Did you know that Elisabeth Kübler-Ross actually developed her five-stage theory on the grief process while she was grieving over how much time she spent grading papers? Well, maybe not, but here's a [humorous article](#) describing the connection between the five stages of grief and the five stages of grading.

excited. “They think, ‘This is going to be fun,’” he says. They don’t realize that his strategy is based on the first principle of good practices in undergraduate education, “Encourage Student-Faculty Contact,” meaning, better classroom communication translates into better learning.

“It gives students in a large class the feeling that you’re more approachable,” he says. “You might miss their hand signals, but not their text message.” The messages give him a written record of the students’ questions as well as insight into underlying misconceptions or lack of understanding about content.

At first, Woelk designated a GTA to screen the messages as they came in and then forward to him any she thought worthy of follow-up. Using breaks during the lecture, such as when students were discussing a question they had answered using personal response systems (clickers), Woelk would peruse the incoming messages and answer them before continuing with his material.

After some practice, he was comfortable enough to have the questions come directly to his laptop on the podium where he skimmed through them at natural breaks in the lecture (for example, when moving from one content area to another) and then chose which ones to answer on the spot.

He found that the messages fell into one of six categories:

- **Messages that should be addressed immediately.** These are questions that show students are confused, lost, need clarification or they just aren’t getting the material. These answers can’t wait until the next class period or even the end of the current lecture.
- **Messages that could be addressed immediately.** Woelk uses his discretion on these questions to either handle them during the class period or wait until the next lecture. If the questions show a lack of knowledge about basic science and math that the students need in order to be successful in chemistry, he will recommend some remedial help, such as LEAD sessions.
- **Messages addressed at the beginning of the next lecture.** Sometimes students ask questions that require Woelk to do some further digging to answer. Or, the questions are not immediately pertinent to the material at hand and can wait. He will begin his next lecture with a power point using the questions from the last class and his answers.
- **Messages posted on the discussion board.** If there is a question in which all of the students could weigh in, he posts it on the discussion board on Blackboard and makes it part of an assignment.
- **Inappropriate messages.** A few messages have been rude or demeaning to him or to peers. Woelk uses even these as teaching opportunities. He explains the correct way of communicating with others and what NOT to do, showing the anonymous texts as his example.
- **Funny messages.** Students come up with a lighthearted approach about their grades or what they are learning. Woelk can turn that into a teaching moment as well with a little thought and creativity, such as his answer for “What is the chemical name for beer?” Answer: “Be (beryllium) + Er (erbium),” and then showing how to arrive at the weight of “beer” in grams/mole. (See his power point presentation [“Texting as a Teaching Tool”](#) for other examples.)

There are one set of questions Woelk does not address directly – those answered in the syllabus. He will group all of these questions together on a power point and then give the class the answer: “Read the syllabus!”

Although his strategy is innovative and helpful to the majority of students, Woelk’s goal is to *eliminate* the need for texting by semester’s end. “The point is to make the tool obsolete,” he says. He wants to get the students involved in classroom communication by being confident enough to speak out on their own. The texting is a bridge to accomplish that, and he has witnessed his classes move toward more live interaction as the semester progressed.

In a survey at the end of Fall 2009 and Spring 2010, more than 50 percent of his Chem 1 students said the texting option was helpful or very helpful, while 5 percent said they were unhappy with in-class texting.

From an instructor’s point of view, Woelk found that many potential concerns about allowing texting turned out to be non-issues, such as:

- *While students are texting, they're not paying attention.* Woelk argues that if students are confused or have questions, they are probably not learning anything past the point of their confusion anyway. "It's better that they ask the question then and get back on track, rather than losing them completely."
- *Answering text questions will take time away from covering content in the lecture.* Woelk has not had to reduce any of the content that he teaches in his courses now as compared to before he allowed texting.
- *Students will be frivolous or abusive with their messages.* The messages are anonymous, but if necessary, the instructor can trace a phone number back to a student in case of extreme abuse of the privilege. A specific phone number can also be blocked from being received, but Woelk has never had to use that option.
- *Students will text one another instead of using the tool to ask questions of the instructor.* Woelk's answer: So what? They are texting one another anyway. In a large lecture class, he says it would be as hopeless to eliminate social texting as it is to keep some students from sleeping. He would rather try to capitalize on a communication method students are already using in order to help them learn more effectively.

There is one concern that could be a legitimate challenge for faculty, however, and keep them from experimenting with this communication method: Instructors must stay abreast of the texting abbreviations that seem to be universally known by all students under age 25.

"I tell my students, if you abbreviate something in your text," Woelk says, "don't laugh at me if I have to ask you what it means."

LOL

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HARVARD PHYSICS PROFESSOR TO SPEAK AT TLT CONFERENCE

Eric Mazur, Balkanski Professor of Physics and Applied Physics at Harvard University, will be the keynote speaker at Missouri S&T's annual [Teaching and Learning Technology Conference](#) March 11-12 on the topic of the science of teaching.

An internationally recognized scientist and researcher, Mazur leads a vigorous research program in optical physics and supervises one of the largest research groups in the physics department at Harvard.

In addition to his work in optical physics, Mazur is interested in education, science policy, outreach, and the public perception of science. To this end, he devotes part of his research group's effort to education research and finding verifiable ways to improve science education.

In 1990, he began developing *Peer Instruction*, a method for teaching large lecture classes interactively and which has been adopted across many science disciplines.

CERTI is a co-sponsor in bringing Mazur to the S&T conference.



Jeff Schramm and a Thomas Edison wax cylinder record that he uses in his classes

Technological Artifacts Help History Teacher Engage Engineers

Jeff Schramm is not a person to waste an experience.

When he came to Rolla in 1987 as a high school graduate from the Chicago area, he set his sights on becoming an engineer. Midway through the program, he found his interests changing direction and left Rolla with a B.A. in history instead.

Now he is back in Rolla teaching history to mainly engineers after having received his master's and Ph.D. degrees from Lehigh University. Is he surprised? "Never in a million years" is how Schramm described the likelihood of him ending up back where he started. But in 2002, when the position opened up at his alma mater, he found himself teaching subjects he loves to students he can relate to.

"Engineers and scientists are very practical," he says. "They

love hands-on things.” Schramm, who is somewhat of a kinesthetic learner himself, discovered that the rigorous math and science courses he took years ago turned out to be helpful in relating to his students. He began looking for ways to add more tangibility to his lectures and found that “technological artifacts” helped him turn history into something students can touch and see.

In his History of Technology class, a popular humanities course for S&T engineers and one required for all architectural engineering majors, Schramm gets a lot of bang for his buck with a technological artifact that he found for less than \$5 at a local antique shop. It’s a wax cylinder record developed by Thomas Edison in 1888 that was designed to be used on the inventor’s well-known phonograph created 10 years earlier.

The record itself is a simple item that has generated numerous classroom discussions, such as:

- the type of material used for the record (not plastic but hard wax)
- the music of that era on the record (a banjo tune called “The Smiler” – which can still be heard on YouTube!)
- even the licensing agreement on the cardboard sleeve of the record, which brings up the topic of copyright in this era of ubiquitous music piracy.

The discussions around these topics are animated, and the students’ questions reflect deeper thinking. “They’re thinking, they’re engaged,” Schramm says. “You can tell just by the look on their faces.”

Schramm admits that his artifacts are simply a type of show and tell, which is definitely not new to education, but if it keeps students more interested in the class material than in texting their friends, he is happy to continue using it.

Recently, an article he wrote describing the strategy was published in the Organization of American Historians’ Magazine of History. (July 2010) In the article, he also suggests taking students on field trips to various sites, from military museums to railroad cars and depots, to examine the myriad of technological artifacts awaiting discovery.

“Most people think technology is electronics,” he says. “It’s not. It’s something that humans create to make our lives easier, and it’s the ways we alter the environment to make our lives easier.”

Artifacts tell the story of a culture during a certain period of time. “It’s not just music and art that tell the story,” he says. “If you know how to read them, you can tell a lot about an era by just looking at certain things,” be it an American Indian arrowhead or a piece of an airplane or even an iPhone, which Schramm says will be a technological artifact in 50 years.

In his article, he uses the example of railroad depots to generate discussion about social norms in an earlier time in American history. For example, students can note the separate waiting rooms not only for “whites” and “coloreds” but also for men and women.

Although budget constraints have limited some of the field trips Schramm would like to take with his students, he still gets his Architecture, Technology & Society students out of the classroom and into historical buildings on a field trip to Ste. Genevieve each semester. The students love it, and Schramm thinks the partnership of history and engineering is a win-win for everyone.

“How can you design things in the future if you don’t know how we got here in the first place?” he says. “How can you know where you’re going if you don’t know where you’ve been?”



Curators' Teaching Professors, from left, Roger LaBoube, Lawrence Christensen, Larry Gragg, Kent Peaslee, Dee Montgomery and Jim Drallmeier

Curators' Teaching Professors Share Insights on Balancing Teaching, Research



Ali Hurson, computer science department chair, at a recent summit

The second annual Curators' Teaching Summit was held this semester, sponsored by CERTI. A panel of six Curators' Teaching Professors answered questions from the audience on the topic of balancing teaching and research.

Here are some excerpts from the first session in September from panelists Lawrence Christensen, Larry Gragg, Jim Drallmeier, Roger LaBoube, Dee Montgomery and Kent Peaslee:

On working toward balance:

"It changes over the course of one's career because demands of your department will change. It doesn't remain static. It depends a lot on the individual and their life circumstance." (Jim Drallmeier, mechanical & aerospace engineering)

"Schedule your family time in your calendar just like you do your job. On Sunday, I'm not going to do anything; same thing for a couple of evenings a week. It's hard to put a number on it (how many hours I work a week). I don't want to work 85 hours per week *every* week." (Kent Peaslee, materials science & engineering)

"I would never take more than about three graduate students at one time. Any more than that, I didn't feel I had time to devote what I should, plus it took away from the teaching aspect of it as well. On the service end, I never raised my hand to volunteer for anything. If someone asked me to do something, I would say yes, but I never raised my hand." (Roger LaBoube, civil engineering)

"Faculty members need to decide what they're good at. You can't be excellent at all three (service, teaching and research). Everybody has the responsibility to teach and to teach well – or as well as they can. That is one of the bases of



Congratulations to the 2010 Faculty Excellence Award Recipients

Five S&T faculty members have been recognized for demonstrating sustained excellence in all three missions of the institution: teaching, research and service in 2010. They are:

[Joel Burken](#), professor of civil, architectural and environmental engineering;

[Scott Grasman](#), associate professor of engineering management and systems engineering;

[John Myers](#), associate professor of civil, architectural and environmental engineering;

[Matthew O'Keefe](#), professor of materials science and engineering;

[Hai Xiao](#), associate professor of electrical and computer engineering.



Thirty-four S&T Faculty Earn CET Awards

Thirty-four S&T faculty were cited for exemplary instructional effectiveness based on their end-of-course student evaluations.

The awards were spread fairly evenly over 15 different departments on campus. To see a list of CET winners, go [here](#).

employment. Then you have to decide what you are good at in terms of research and pursue that.” (Lawrence Christensen, ret., history)

“I remember wanting the magic formula and wanting it to be the same for the rest of my career. And I’ve never found it. I think it’s a process that you’ve got to learn to struggle with.” (Dee Montgomery, psychological sciences)

On being an asset to your department and working toward tenure:

“Every faculty member has to make arrangements with his department about their activities. A new faculty member ought to know exactly what does the chair or department as a whole believes should be the participation of that faculty member.” (Larry Gragg, history & political science)

“What does the chair want in the coming year? The chair might be thinking of putting out the fire, but you’ve got to be focused on what to do to be tenured. From the day you step on the campus, you have to take responsibility for your career and where it’s going to go. Start your dossier from day one. It’s too easy to find yourself doing things that are not adding to promotion and tenure.” (Montgomery)

On the value the campus places on good teaching:

“The word shouldn’t be ‘teaching.’ It should be focused on learning. The spotlight ought to be on student learning. It’s obvious that there’s room for improvement, but just the fact that we have Curators’ Teaching Professors indicates the premium that the university puts on this activity.” (Gragg)

“There is a value on teaching at S&T. It varies widely, but at least people are asking questions about teaching.” (Montgomery)

How the panelists define “good” teaching:

“Atmosphere, coaching, mentoring are all as important as what you present (in the class). Atmosphere is where they feel that what you present is important, feel that they can see you outside of class. All of this can create an atmosphere that is important to their success.” (Peaslee)

“It’s not techniques; it’s heart. I tell the students my purpose here is to get you excited about this material.” (Drallmeier)

On integrating research with classroom teaching:

“For me, it’s not teaching here and research here. It’s the same thing. I teach as part of my graduate education program. When I go to the lab and work with my graduate students, I’m teaching. I take what I learn in the lab back to the classroom to my undergraduate students. I bring the undergrads back into the laboratory. It’s one continual process.” (Drallmeier)

“They are symbiotic. What you learn in research, you bring into the classroom almost immediately.” (Christensen)

(Video clips and synopses of the second and third sessions of the summit will be made available on the CERTI web site in the near future.)

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