

e-Learning UPDATE: Clickers in UMC Classrooms (long version)

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Today's academic medical center faculty was typically trained under an education system based entirely on didactic lectures. Because the choice of teaching method is typically based on known and familiar methods, didactic lecture methods have persisted. However, if the aim is to teach thinking or change attitudes beyond the simple transmission of factual knowledge, then lectures alone, without active involvement of the students, are not the most effective method of teaching.¹ The goals of teaching as discovered by Isaacs are: to arouse and keep students' interest, to give students facts and details, to make students think critically about the subject, and to prepare students for their own private studies by demonstration of problem solving and professional reasoning.² Isaacs notes however, that only two of these purposes are well suited to didactic lectures. The problem then is how to organize lecture material so that individual student's learning needs are better addressed. Gibbs suggests that lecture sessions contain a variety of activities designed to stimulate individual students to think.³ These activities include in-class discussion, working problems during lecture time, questions included in the lecture, and quizzes at the end of lecture, among others.

An important facet of interactive learning techniques is engagement of the students through *reciprocal learning*. Palincsar, Brown, and Campione define reciprocal teaching as a dialogue between teacher and student.⁴ This dialogue is described as reciprocal because each learner acts in response to another. This interaction may occur between teacher and student or between students. The dialogue is structured by the use of four strategies, sometimes known as the Fabulous Four: predicting, questioning, clarifying and summarizing.⁵ The goal of reciprocal teaching is to use real-time feedback to enhance students' comprehension, develop self-regulatory and monitoring skills, and improve motivation. Reciprocal teaching is a constructivist method of teaching, the basis of which is that students draw their own meanings from what they hear in lecture, based on their understanding of the content combined with their prior experiences. Real-time interaction with the teacher and other students is critical to reciprocal teaching.

Asking the students questions is one of the simplest but most effective techniques to engage learners. At the beginning of a lecture, questions may serve as advance organizers which provide a framework for the students upon which to hang the lecture content, and as repetition. Surveying the class is useful for identifying the audience' needs and interests, assessing the students' baseline level of knowledge, and to motivate students to focus on the topic.

With respect to reciprocal learning, questions can be used to: focus *attention*, arouse *interest*, enhance *inclusion* by drawing out the reticent learner, obtain *student feedback* on the progress of the lecture, assess the level of *understanding*, assess the ability to *apply learned concepts and knowledge*, stimulate and guide *thinking and reflection*, explore different *viewpoints*, promote discussion and *sharing*, keep the discussion *on track*, *summarize* progress and *consolidate* learning. Questioning and surveying a large seminar class with over 100 members can be difficult. Students are unlikely to participate and it is unrealistic to achieve any consensus in an efficient time. The development of classroom response systems allows for real-time, class participation in a large scale format without sacrificing control of the classroom and brings with it a "small classroom feel."

Many of our current medical students are "Tech-savvy 'Millennials', [who] have lots of gadgets, like to multitask and expect to control what, when and how they learn."⁶ Also termed the Net Generation or Digital Natives,⁷ they are taught by "Digital Immigrants" who came to computing late in life. In the words of Marc Prensky, "Our students are no longer the people our educational system was designed to teach... They really do think differently from the rest of us ... we now have a new generation with a very different blend of cognitive skills than its predecessors."⁸ Many millennial students have affection for technology, team work and visual learning. They need customizable, flexible learning formats that allow students to construct their own understanding with regular interventions to combat their fear of boredom and short attention span.⁹ Digital Native students might better relate to their Digital Immigrant educators if the Immigrants adapted to the

Native's preferred learning styles.”^{7, 8} Our “students must be actively engaged with the material we are trying to teach them... Part of the process of getting students to become critical thinkers involves getting them to practice meta-cognition, that is, they must become aware of not only what they are thinking but also how they are thinking.”¹⁰

PRS, in use since the 1990s, have received accolades at a number of institutions for meeting many needs of both Digital Native students and their Digital Immigrant educators.^{11, 12, 13} PRS can be used as a combination of interaction and assessment to enhance classroom productivity by: a) visually graphing student responses to identify content areas for additional review/re-teaching; b) facilitating group or independent study by discussing how answers to questions can be found through a critical thinking process modeled by the professor and practiced in class; c) testing student recall of important concepts prior to and during lecture to assess retention; and d) measuring learning outcomes through brief in-class formative assessments. Many students find that boring lectures, normally “not worth attending,” became more engaging when the lecturer took a break from their usual didactic presentation and involved the students in a discussion of course content directed by their participation. In a study at Minot State University in 2007¹³, students found that addition of PRS to their classes, helped them understand the course material, prepare for exams and improve their overall learning and retention of course material. Faculty reported that incorporation of technology added to their preparation time but student success made it worth the effort. Training and support were important to the success of the program. Students found that their positive experiences led to their desire for more courses to incorporate technology tools into the curriculum in that these tools present course content in ways that appeal to different learning styles.

UMMC standardized on [Interwrite PRS RF](#)[®] (Personal Response System, Radio Frequency) Clickers. Some Dentistry, Health Related Professions and all School of Medicine freshman students were required to purchase a standard clicker from the UMC bookstore for their classes in 2007. They will keep their clicker throughout all four years of their programs. Faculty Development grant funds were used to purchase 100 clickers and several RF receivers for use by the faculty involved in the project. The departments of Physiology, and Biochemistry in the M1 year and the departments of Microbiology and Pharmacology in the M2 year participated in the introduction of clickers into the SOM curriculum. PRS RF receivers and [software](#) were installed on selected classroom computers. The initial results of these trials will be presented in the second half of the Clicker Training day described below.

Clickers in UMC Classrooms! Tuesday, June 3, 2008 in R153

12:-12:50 - Clickers in UMC Classrooms – Our professors share their experiences with clickers and demonstrate how they use these devices in their classes – Audience participation required!
We will be using clickers in these classes!

1:3 - Afternoon Breakouts – Faculty/Staff Training: “How to Use Clickers in YOUR Class”.

Additional Reading:

EDUCAUSE Learning Initiative, **7 Things you should know about clickers**. 2005.

<http://connect.educause.edu/Library/ELI/7ThingsYouShouldKnowAbout/39379>

Duncan, Douglas, **Clickers: a new teaching aid with exceptional promise**. 2006. Astronomy Education Review, 5(1):70-88, 2006-2007 <http://aer.noao.edu/cgi-bin/article.pl?id=194>

Beatty, I. 2004. **Transforming Student Learning with Classroom Communication Systems**

<http://connect.educause.edu/Library/ECAR/TransformingStudentLearn/40085>

Martyn, M. 2007. **Clickers in the Classroom: an Active Learning Approach**. Educause Quarterly 2007(2)71-74. <http://www.educause.edu/ir/library/pdf/EQM0729.pdf>

Search: EDUCAUSE CONNECT/Teaching and learning/Instructional Technologies/Classroom Response Systems http://connect.educause.edu/term_view/Classroom+Response+Systems

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4. Palincsar, AS., Brown, AL. and Campione, J. 1989. Structured dialogues among communities of first grade learners. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, California.
5. Oczkus, L. 2003. Reciprocal teaching at work: strategies for improving reading comprehension. Newark, DE: International Reading Association.
6. Carlson, S. 2005. The Net Generation goes to college. *The Chronicle*:10/7/2005
<http://chronical.com/weekly/v52/i07/07/a.3401.htm>
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8. Prensky, Marc. 2001. Digital Natives, Digital Immigrants, Part II. Do They Really Think Differently? On the Horizon, NCB University Press, 9(6, December) <http://www.scribd.com/doc/9800/Prensky-Digital-Natives-Digital-Immigrants-Part2>
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10. McGlynn, A. and Provitera, B. 2005. Teaching Millennials, Our Newest Cultural Cohort. *The Hispanic Outlook in Higher Education*. 16:(October):9-20. www.eddigest.com
11. University of Milwaukee Student Response Systems (SRS), The UW-System Clicker Project
<http://www4.uwm.edu/lrc/srs/> Educause 2006 Presentation: "[Clickers](#)" in the Classroom: Analyses from the [University of Wisconsin System Project](#) -- PDF file of presentation given at EDUCAUSE 2006 in Dallas, Tx.
12. Ohio State University, Technology Enhanced Learning and Research (TELRL) Site: <http://www.telr.osu.edu/clickers>. (project report: <http://www.telr.osu.edu/clickers/about/index.htm>)
13. Horvath, C., Warmoth, KM., Minot State University. 2007. Technology to Advance Learning: A Pilot Study. www.educause.edu/Browse/645?PARENT_ID=697.