Using Evidence to Improve Teaching and Learning (with Technology): Asking the Right Questions

http://tinyurl.com/cp6gs2

Stephen C. Ehrmann
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I. Your responses to the survey

II. A “Good Problem” in education

III. Evaluating one response to that problem in order to fine-tune it

   A. Methods of evaluation
   B. Surveys
   C. Matrix Surveys and the Scholarship of Teaching and Learning
Experience with Clickers

1. I’ve never used clickers before now. 42%
2. I’ve used a clicker before now, but not as an instructor. 32%
3. As a teacher, I’ve mainly used clickers to see what students remember, so I can adjust what I’m doing. 8%
4. As a teacher, I’ve mainly used clickers to quiz students and grade them instantly. 6%
5. As a teacher, I’ve mainly used clickers to deepen students’ thinking. 6%
6. Other 6%

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Survey Responses

• [http://tinyurl.com/cwmrp3](http://tinyurl.com/cwmrp3)
  – Also linked to the resource page
“In any class, I want to know what my starting point should be in order to ensure I'm not beginning in a place that will cause some students to be lost. For instance, in an entry-level composition course, I might ask some basic questions such as what is your personal process for writing? What are some ways you overcome writer's block? etc. I initiate this questioning on day 1 to begin our semester conversation.”
Examples of Inquiry (2)

• “What was your "research process" for this ___x___ [project]? Did it include electronic library resources?? If so, how did you find what information you needed?? Along the path for this project, did you ask for assistance (in person or long-distance (phone or e-mail or chat)? If you didn't use the Library (physical or virtual), do you have any idea what sources you did NOT get access by making that choice?”
Examples of Methods

• “We used student ambassadors that served as communication conduits from students to faculty. Ambassadors would solicit feedback from other students in the course. Faculty would meet with ambassadors 3-4 times a semester for feedback. I was able to make some directions for assignments more clear from this input.”
“At least once a week I simply ask the class for a show of hands to find out their level of comfort with a topic, whether or not a particular activity was helpful, their preferences for types of activities, readings, evaluations, etc. I don't always go with what they say their preferences are, but I feel it is important for me to keep in contact with their point of view.”
• “This semester I polled students at the beginning of the semester (paper and pencil) about the topics and vocabulary they wanted to explore and become more fluent with and we built the class around that.”

• “I frequently make part of my lesson plan from themes of errors I see in student homework.”

• “mid-semester survey”
As teachers, faculty are sometimes embarrassed by problems and seek to avoid them.

As researchers, faculty seek good problems.

Passed along by Prof. Randy Bass, Georgetown University.
A Good Problem

• **How many graduating seniors:**

  – Don’t understand physics, chemistry or biology enough to understand how an oak tree becomes heavier than an acorn?
  
  – Don’t understand circuits enough to light a light bulb with a batter and one piece of wire?
  
  – Don’t understand physics enough to predict what will happen to their reflections when they back away from a mirror?
  
  – To see MIT and Harvard graduating seniors wrestle with problems like these: [http://tinyurl.com/cp6gs2](http://tinyurl.com/cp6gs2)
What fraction of students completing your program with B or better average would show this kind of misconception?

1. Almost none (Less than 5%)  
2. Some (5-20%)  
3. Plenty (21-40%)  
4. Epidemic (41% or more)
Thomas Kuhn; old scientists often die without ever changing what has become common sense to them

If we’re not helping students change their paradigms on campus, are we doing even worse online?

My hunch: We need to change both, and take advantage of both, if students are to really master the ideas and skills of greatest importance
What Can Be Done: Example

• **Study of intermediate chemistry course at University of Wisconsin**
  
  – See [http://tinyurl.com/cp6gs2](http://tinyurl.com/cp6gs2) for this and other resources

• **Other useful strategies for helping students master ideas to apply them (even months or years later)?**
Peer Instruction During Lecture

1. Pose a question that requires thought, not memory, to answer

2. Poll students (semi) anonymously using clickers or some other polling technology

3. Students pair up to discuss how to answer the question

4. Students are polled individually again
Asking Students to Think

• “I’m going to combine these chemicals in a moment. What will the result look like?”

• “You’ve just listened to a student team presentation using online resources. Given the sources they cited, how trustworthy was their argument?”

• Questions you’ve used?
What Should Worry Faculty Most about “Assessment?”

10% 1. Assessment reduces everything to numbers

4% 2. Assessment is controlled by other people, not the instructor

0% 3. Loss of privacy in teaching

0% 4. Threat to job, P&T chances

20% 5. Assumes all students are supposed to learn the same thing

24% 6. Used properly, assessment is empowering, very worrisome

42% 7. _________

Example
Research indicates that this strategy usually helps deepen understanding, and help students learn to apply ideas to unfamiliar problems.

Evaluation is necessary to:

- See whether it’s working for you, and
- What you can do to make the technique work better in your own course.
Activity v. Technology

- Why evaluating technology in order to improve learning doesn’t work
  - Example: distance learning

- Other uses of clickers include taking attendance, instant graded quizzes, ‘did you hear what I just said’, ‘did you read and remember the material,’ …

- We’ll focus our discussion on evaluating polling to support peer instruction
Principle #1

• *If you need to understand whether a resource, technology, or facility can improve learning, and how to get more value from it, study:*
  
  – What various students actually do with that resource (if anything),
  
  – And why they each did what they did
Dorbolo’s Survey

• How interesting/fun was this activity?
• How useful do you think it will be for your future life?
• Suppose you had asked one or two thinking questions, polled students (etc.)

• You want to know how well it’s working, OR you want to learn how to do it better
  – What are one or two questions you’d ask your students in a survey?
Example Feedback Form (Draft)

- http://tinyurl.com/dl5m2q

- What questions would you add or change?
**“Traditional” Online Survey**

- **Respondent pool: the people who see this survey**
- **Every item must make sense to (and for) every person in the respondent pool**

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Items 1, 2, 3, ....
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Several Respondent Pools

- Each pool sees the same question group
- Different URLs for each pool, so pools can be analyzed separately or together

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Different Question Groups for Different Respondent Pools

- Each pool sees a different mix of question groups
- Different URLs for each pool so the respondent pools and question groups can be analyzed separately, or together

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Different Response Form
Same Survey

• http://tinyurl.com/ddd4zs
Advantages of Matrix Surveys

• You don’t have to ask the same questions all the time, so questions can be much more specific, concrete

• You can pool data to get a larger “N” and see tendencies you might have missed or ignored

• You can look at trends over time

• You can work with colleagues on questions, data analysis

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• **Studying your own courses in order to evaluate and improve them**

• **Sharing what you learn with colleagues**
Features of Flashlight Online

- Share questions with other authors (e.g., colleagues here, Drexel, Flashlight staff)
- Tailor wording (what is the polling technology called in each class?)
- Send out different response forms at different times, but still collect data in the same place
- Send out reminders to non-respondents while maintaining their anonymity
“Asking the Right Questions” (ARQ) materials

- Workshops 10-15 minutes long
- Online materials
- Pass it forward
Thanks

- **Questions? Comments?**

- **If you like this kind of thing, individual membership is free (if you’re at Rolla).** Go to [www.tltgroup.org](http://www.tltgroup.org) for information about memberships and inst’l subscriptions

- **And if you’d like to develop, or help me develop, the matrix survey on personal response systems, my email is below!**

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Red Flags

• Naïve approaches to evaluating technology use often:
  – Focus on the technology itself
  – Measure changes in goals (outcomes) that are the same for all users (“uniform impact”)
  – Focus (only) on hoped-for gains in outcomes, compared with doing nothing
  – Wait to start inquiry until things are smooth, so that there’s a good chance that the findings will be positive, and can be used to elicit rewards.