Experiments in the Classroom: Assessment and the Scholarship of Teaching and Learning

Jennifer Mihalick and Dale Buechler

How do we know what students are learning?

Learning Objectives

- What you want them to learn

- How could you tell if they did learn it?

Classroom Assessment Techniques

- Few minutes of class time
- Instructor review after class can also be brief

Classroom Assessment Techniques

Examples of index card assessments:

- minute paper
- muddiest point
- one sentence summary

Student response systems "clickers"

Even the most dedicated college faculty often discover that their students haven't learned what they are trying to teach - and that much of what students do learn is quickly forgotten after the final exam. Traditional testing methods have been limited measures of student learning, and equally importantly, of limited value for guiding student learning. These methods are often inconsistent with the increasing emphasis being placed on the ability of students to think analytically, to understand and communicate at both detailed and "big picture" levels, and to acquire life-long skills that permit continuous adaptation to workplaces that are in constant flux. Moreover, because assessment is in many respects the glue that links the components of a course - its content, instructional methods, and skills development - changes in the structure of a course require coordinated changes in assessment.

Is there a gap between what you're teaching and what your students are learning?

What do you want your students to learn?

What are they actually learning?

Our assessment tools tell students what we think is important to learn. The tests commonly used in college science and math courses usually emphasize fact-based knowledge and algorithmic problem solving. Innovative assessment methods emphasize deeper levels of learning and give instructors valuable feedback during a course.

How do you find out?

Classroom Assessment Techniques

- When might you use them?
  - end of class reflection
  - midclass break
  - beginning of class review

- Practice with a topic that should go well

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HIGHER ED TEACHING STRATEGIES FROM MAGNA PUBLICATIONS

Using Classroom Assessment Techniques: A Proactive Approach for Online Learning

By Emily Bergquist and Rick Holbeck

There are two main forms of assessment often used within the online classroom. Both formative and summative assessments evaluate student learning and assist instructors in guiding instructional planning and delivery. While the purpose of a summative assessment is to check for mastery following the instruction, formative assessment focuses on informing teachers in ways to improve student learning during lesson delivery (Gualden, 2010). Each type of assessment has a specific place and role within education, both traditional and online.

To reach higher efficiency and success, formative assessments such as Angelo and Cross' (1993) Classroom Assessment Techniques (CATs) can be used to check for student understanding prior to the summative assessment within the online classroom. The following strategies have been found to be both simple and effective for both the instructor and student in online modalities.

Out-of-Classroom Assessments

Multiple Choice Quizzes in D2L

- Check prior knowledge, find misconceptions
  - set up to provide feedback, see how many attempts required
- Check completion of reading assignments
- Pre-homework feedback
- “Just in time" testing of prerequisite material
- Pre-lab assignments

Course and Program Assessment

- Major learning goals
  - might not all be checked each semester
- Some professional organizations have standards
- Can use both graded and ungraded work
- Rubrics simplify evaluation process

Rubric Examples

- **RUBRIC** (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- **RUBRIC** (g-oral) an ability to communicate effectively

Rubric: Design Experiments

1 point	Assumptions are incorrect. Engineering problems incorrectly identified. Experimental design will not answer the question.
2 points	Experimental design was not valid, but assumptions were correct.
3 points	Experimental design was valid but some assumptions were incorrect.
4 points	Experimental design was valid and assumptions were correct.

From: Rick Reis <reis@stanford.edu>
Subject: TP Msg. #1274 Quantitative Assessment Methods
Date: September 26, 2013 8:33:38 PM CDT
To: tomorrows-professor <tomorrows-professor@lists.stanford.edu>

A traditionally favored type of research design that has influenced outcomes-based assessment methodology is quantitative assessment. Quantitative assessment offers a myriad of data collection tools including structured interviews, questionnaires, and tests. In the higher education setting, this type of design is found in many nationally employed assessment tools ..., but can also be locally developed and used to assess more specific campus needs and student learning outcomes.

TP Msg. #1274 Quantitative Assessment Methods

The posting below looks at various uses for quantitative assessment techniques in higher education. It is from *Chapter 4, Assessment Methods, in the book, Demonstrating Students Success: A Practical Guide to Outcomes-Based Assessment of Learning and Development of Learning and Development in Student Affairs*, by Marilee J. Bresciani, Megan Moore Gardner, and Jessica Hickmott.

Regards, Rick Reis reis@stanford.edu

UP NEXT: What's "Best" in Our Practices? (in teaching and learning)

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Check out the Tomorrow's Professor Blog at:

http://derekbruff.org/blogs/tomprof/

The Scholarship of Teaching and Learning (SoTL)

- Formal study of what happens in classrooms
- Research questions
  - What works?
  - What is going on?
- Institutional Research Board must approve project design

Data Collection Methods

- Survey
- Interview, focus group, written reflections
- Think aloud
- Observation

Campus and System Support for SoTL

- Campus centers for teaching and learning

- UW System Office of Professional and Instructional Development (OPID)
  - Spring Faculty College
  - Wisconsin Teaching Fellows & Scholars

Reflections on Multiple Ways of Learning Science

- Do students recognize the learning that results from participation in different course components?
- Which learning methods do they think are more effective for particular learning objectives?
- Are their perceptions influenced by their preferred learning styles?
- How well are students able to judge their own learning?

Can Pen Tablets Be Used to Improve the Performance of Place-Bound Engineering Students?

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Pilot Study Details

Each Study Participant received:

- Pen tablet for semester
- Tutorial on tablet use

Each Study Participant agreed to:

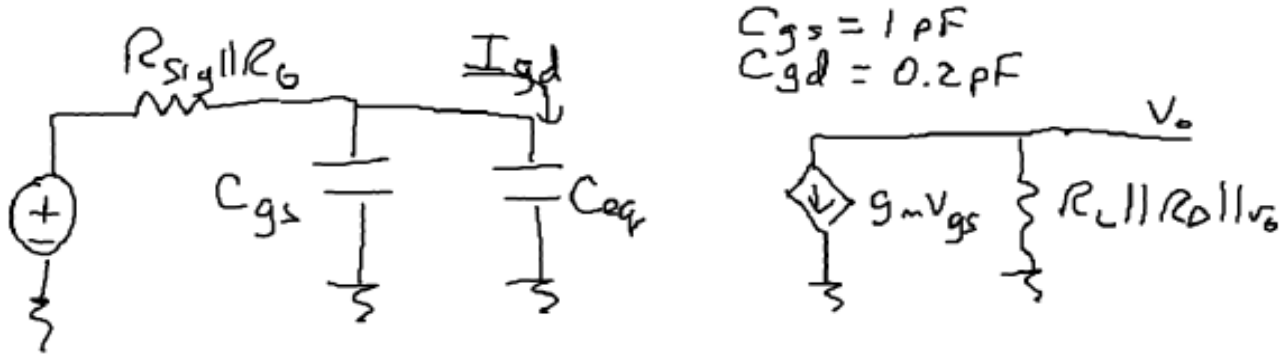
- Complete two think-aloud sessions with instructor
- Complete an end of the semester survey

Think-Aloud Sessions

Troublesome concepts during the past two offerings of analog electronics selected for think-aloud sessions in lieu of homework

- On-line meeting of student and instructor
- Student solves problem on electronic whiteboard using the pen tablet
- Student verbally explains each step during the solution of the problem
- Instructor questioning/feedback provided

Sample Online Session



$C_{eq} = 2.6488\,pF$

$C_{in} = 3.6488\,pF = C_{gs} + C_{gd}(1 + g_m(R_L \| R_D \| r_o))$

$R_{eq} = 50K$

$f_H = 872{,}368\,Hz$

$2 \times f_H \rightarrow R_{eq} = (\frac{1}{2})50K \longrightarrow R_G = ?\ 33.333K$

OR $C_{in} = (\frac{1}{2})3.649\,pF$

Think-Aloud Results

- Quiz over 1st think-aloud material
  - Highest Avg. Quiz Score of Semester

  80.83% (69.79% avg on other quizzes)

- Final Exam Problem over 2nd think-aloud material
  - 96.1% Problem Average
  - 72.1% and 76.7% prior exam averages on same topic

Survey Results (Likert Scale)

n = 6, 50% trad. /50% non-trad.
66.7% working over 20 hours/week

Pen tablets useful in this course

33.3% SA, 50% A, 16.7% N

Pen tablets useful in future distance courses

83.3% SA, 16.7% N

Think alouds should be used in future courses

66.7% SA, 33.3% A

OPID Undergraduate Teaching Improvement Grant

- What major challenges do instructors encounter as they implement culturally responsive and learner-centered pedagogy?

- How did a group of instructors manage these challenges?