Formative Assessment: Gauging Students’ Conceptual Understanding While You Teach

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In this session, we will:

- Compare and contrast formative and summative assessment.
- Identify the advantages of receiving rapid feedback on student understanding.
- Discuss different methods for conducting formative assessment in your classroom.
- Design classroom assessment exercises which probe conceptual understanding and real-world connections of material.
Learning Outcomes

Learning Outcomes are statements that specify what participants will be able to know, do, or be after completing a course.

- What knowledge should participants possess?
- What should they be able to do with it?
- What skills should they demonstrate?
- What attitudes, values, or behaviors should they have?

Writing a Specific and Measureable Outcome:

After this course, participants will be able to (action verb) (learning statement).
Bloom’s Taxonomy: Levels of Learning

(Bloom, 1956)

- Synthesis
- Evaluation
- Analysis
- Application
- Comprehension
- Knowledge
Icebreaker:

Share with the group:
- Name
- Department
- What are some learning goals or outcomes which are difficult to measure using traditional quizzes or exams?
Formative vs. Summative Assessment

Summative Assessment
- Tests, quizzes, and other graded course activities
- Cumulative and often reveal what students have learned at the end of a course.
- Includes the calculation of individual student grades.

Formative Assessment
- Any means by which students receive input and guiding feedback on their performance to help them improve.
- Can be provided face-to-face in office hours, in written comments on papers, projects and problem sets.
- Classroom assessment techniques can also provide valuable feedback to students and course leaders.
A professor returns a midterm examination worth 30% of the final grade to the students with a rubric attached which ranks student performance on key skills and concepts.

This is an example of:

A) Formative Assessment
B) Summative Assessment
C) Both Formative and Summative Assessment
D) Neither Formative nor Summative Assessment
1) What are some ways you have seen formative assessment used in your classes?

2) What are some advantages of using formative assessment to receive rapid feedback from students?

Brainstorm on your own, then share your ideas with your neighbor(s).
Classroom Assessment Techniques

- Can be used to measure student learning on a daily, ongoing basis.
- Inform next steps in teaching and learning.
- Don’t rely on old standbys such as “Do you understand?” or “Are there any questions?”
- Systematic and intentional collection of data.
- Reviewing the responses provides insight into what themes students have gleaned from your lecture and what your next teaching steps might be.
- Providing feedback on these themes to students gives them insight into their own learning.
Classroom Assessment Techniques

- Muddiest Point (*Recall, Understanding*)
- Minute Paper (*Prior Knowledge, Recall, Understanding*)
- Application Cards (*Application*)
- Categorizing Grid (*Analysis and Critical Thinking*)
- What’s the Principle (*Problem-Solving*)
- One Sentence Summary (*Synthesis and Creative Thinking*)
- Directed Paraphrasing (*Application and Performance*)
- Classroom Opinion Polls (*Indirect assessment of learner attitudes, values, and self-awareness*)

Include Students in the Process!

- Tell them what and how you are assessing.
- Share your findings with them.
- Based on your findings, decide how you will change your approach and inform the students of the new plan.
- Let them know how they can focus or redirect their learning as a result.
Classroom Response Systems

- Allow for quick collection of data and instant feedback.
- iClickers, Learning Catalytics, informal polling systems.

Image from http://www.crlt.umich.edu/
Class Poll

You’ve just finished teaching a quantum mechanics lecture on particle-wave duality – a tricky concept with many technological applications. You want to measure how well the students are grasping this concept, connecting it to other ideas in physics and chemistry, and understanding why it matters in modern society. Which classroom assessment technique might you choose?

A) Muddiest Point
B) Application Card
C) Categorizing Grid
D) Minute Paper
E) What’s the Principle?
Choose a topic from a familiar discipline [Chemistry, Physics, Statistics, Computer Science (C++), Animal Behavior, Psychology, Cell Biology]

Form groups of 3-5 people.

As a group, create 2 learning outcomes for students based on your topic which might be hard to measure on an exam.

Using the handout as a guide, develop a CAT to measure student gains on each learning outcome.
Wrap up: Your experiences today!

On index card provided, please write:
1) What was the “muddiest point” of this workshop?
2) How do you plan to apply classroom assessment techniques in your own teaching?

Please turn in EVALUATIONS before you leave.
Additional Resources


CATs: http://www.crlt.umich.edu/tstrategies/tssf

Peer Instruction:
http://tlc.provost.gwu.edu/peer-instruction
http://www.physics.umd.edu/perg/role/PIProbs/
http://perusersguide.org/guides/guide.cfm?G=Peer_Instruction
Additional Resources

Polling and clickers:
http://pollinghelp.cit.cornell.edu
http://cwsei.ubc.ca/resources/clickers.htm
https://piazza.com or www.polleverywhere.com or https://learningcatalytics.com

Rubrics:
http://waypointoutcomes.com
http://rubriclibrary.com
QUESTIONS?

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