Learning InSights

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The Insight
Including intentional formative assessment in lectures improves student engagement, content comprehension, and effective student learning.

Implications
Formative assessment data can be coupled with other measures to track student comprehension over time. Relatively simple interventions can have profound positive effects on student learning.

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Clickers & Formative Assessment

Educational assessment is, at its core, simply an attempt to evaluate the quality and extent of student learning in a particular setting. There are two purposes for assessment: 1) to attempt to measure the level of learning at some point in time and 2) to provide feedback and reinforcement to guide further learning. This are often referred to as summative and formative assessment, respectively. Graded assignments (such as quizzes, exams, essays, or performances) are usually summative in nature. The most frequent, effective, and important type of assessment in our classrooms is what is termed formative assessment. Formative assessment involves student-instructor interactions as part of the teaching and learning process. These interactions serve to identify and rectify incomplete understanding or misconceptions during instruction.

The Socratic method is an ancient and effective example of such a blend of teaching and assessment. However, this approach is most effective with relatively small groups of students. As the number of students increases, other approaches may be more manageable. Low tech solutions can include asking students to simply raise their hands or to hold up colored cards in response to multiple-choice questions. While these approaches are simple, easy, and inexpensive, they do suffer from a few drawbacks. Students are often reluctant to participate or appear foolish in front of their peers – these methods do not allow for anonymity. In addition, data collection (while possible) tends to be cumbersome and impractical. There are, fortunately, several solutions to formative assessment in larger class settings. Ferris has standardized upon the classroom clicker system from TurningTechnologies (https://www.turningtechnologies.com). These clickers can be used to respond to questions posed in written form (e.g. paper quizzes), on-the-fly, or embedded in PowerPoint slides. In addition, there are many *FREE* programs for polling or quizzing in class. Two of my favorites are Poll Everywhere (https://www.polleverywhere.com) and Kahoot (https://getkahoot.com). These sites can be used by students with any internet-enabled device (computer, tablet, phone, or watch).

Regardless of the technology used, there are several best practices for formative assessment in the classroom. I like to use Poll Everywhere to post a welcome question for students as they are settling into the lecture hall. Such questions typically take the form of "what did you find most confusing in our last lecture?" Questions can also be used at the beginning of a class period to evaluate the status of the students' preparation for the session. Formative assessments can also be used to "chunk" course materials. Concept check questions may be embedded after presenting a concept or a case study problem. I have found that the students remain much more engaged with such an approach. In addition, it is much easier to determine when and where the class is having difficulties with the lecture materials. A final type of formative assessment is a before and after question. An opinion-based question such as "Rate microbial interactions with humans from 0=complete detrimental to 10=completely beneficial" are given to the students before and after a lecture on the nature of human-microbe interactions. The students and I very interested in how opinions change (or not) during the course. All of the software mentioned above are capable of capturing the student response data. These data can be an important part of a larger assessment project in your classrooms.