

Review of Online Module

Week 4: Assessment

Module 4: Types of Assessment and Mindsets

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Learning goals of the online module

1. Describe the four elements of the feedback loop cycle. Describe the people who can be involved in the feedback loop cycle. Name at least one assessment strategy that helps students complete the feedback loop cycle.
2. Articulate why spending time listening to student (sometimes “wrong”) ideas and giving airtime for these ideas in our courses is important.
3. Describe at least one strategy for modifying traditional assessments to better suit our learning goals.
4. Explain the difference between a growth and fixed mindset. Describe at least one way that both instructor and student mindsets can affect how assessment activities play out.
5. Name two or more factors outside of content knowledge that can affect student performance in STEM courses.
6. Name and describe several research-based surveys and explain their value in educational theory and practice.
7. Articulate and apply strategies around providing concrete suggestions for student improvement on general STEM skills.
8. Apply the principle of growth mindset in developing feedback for students when they do poorly on exams.
9. Apply principles from this module in writing either a multiple choice or free response problem.

Description of main activities of online module

Assessment is a broad and complex area of research and we had to make some choices on what to focus on in this module. Other aspects of assessment will be covered in later modules.

One important topic that we don't cover in great detail is crafting rubrics. We've included an optional video on the topic of “feedback codes” and an optional suggested reading on rubrics. If rubric crafting is a central goal at your MCLC, we encourage you to check out these resources.

Online Videos

- Introduction to Assessment and Feedback [7:55] – Dr. Angela Little from the University of California Berkeley and a group of graduate students from the University of Colorado Boulder discuss their experiences with useful vs unhelpful feedback.
- Feedback Cycles [6:58] - Dr. Angela Little from the University of California Berkeley introduces the concept of feedback cycles and the differences between student centered feedback cycles and instructor centered feedback cycles. In addition, Dr. Sarah Wise from the University of

Colorado Boulder discusses types of assessments that allow the instructor to provide useful feedback to students, using formative and summative assessments as examples.

- Traditional Assessment and Multiple Choice Questions [8:32] - Dr. Angela Little from the University of California Berkeley and others address how traditional forms of summative assessment may not effectively address the learning goals and objectives that instructors have provided to students. They use Bloom's taxonomy as a basis for discussion on how traditional forms of assessment can be modified to align with an instructor's learning goals or objectives.
- Bloomifying Assessment Questions [7:09] - Dr. Angela Little from the University of California Berkeley discusses how Bloom's Taxonomy can be used to create multiple choice questions that address higher order thinking rather than just memory recall. In addition, Dr. Mel Sabella from Chicago State University discusses research regarding differences in student responses to multiple choice vs open ended questions.
- Importance of Open-Ended Problems [2:44] - Dr. Angela Little from the University of California Berkeley introduces the importance of open ended problems in higher education.
- Open-Ended Questions: Focus on the Student, Peer Assisted Reflection [9:10] - Dr. Angela Little from the University of California Berkeley and others introduce the concept of peer assisted reflection (PAR). They discuss how PAR can provide students with a higher level understanding of a topic as well as receive useful feedback from peers.
- Open-Ended Questions: Focus on the Student, Adapting Traditional Problems [7:26] - Dr. Angela Little from the University of California Berkeley and others provide strategies concerning how instructors can adapt traditional homework problems or assignments to give students a deeper or higher level understanding of the concept while keeping them engaged in the assignment.
- Open-Ended Questions: Focus on the Instructor, Strategies [6:49] - Dr. Angela Little from the University of California Berkeley and others provide strategies for drawing out student ideas and misconceptions that will help instructors create effective assessment and feedback tools.
- Open-Ended Questions: Focus on the Instructor, Case Study Part 1 [6:30] - Dr. Angela Little from the University of California Berkeley talks with a first time TA about her experiences regarding eliciting student ideas during her first teaching experience.
- Open-Ended Questions: Focus on the Instructor, Case Study Part 2 [7:48] - Dr. Angela Little from the University of California Berkeley talks with a first time TA about her experiences regarding how she was able to improve her tactics for eliciting student ideas during subsequent teaching experiences.
- Open-Ended Questions: Focus on the Instructor, Planning for Student Responses [08:12] - Dr. Angela Little from the University of California Berkeley and others discuss how instructors can utilize student ideas to plan effective instruction. They also discuss how to create a classroom environment in which students feel comfortable sharing their ideas while the instructor is still able to correct misconceptions and effectively convey concepts to the students.
- Growth Mindset and its Role in Practice and Feedback: Introduction to Mindset [5:29] - Dr. Angela Little from the University of California Berkeley and others introduce the concept of student and instructor "mindsets". They discuss how instructors can use praise and feedback to change student mindsets from "fixed mindsets" to "growth mindsets" using the idea that intelligence is malleable.

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- Growth Mindset and its Role in Practice and Feedback: Integrating Growth Mindset [8:19] - Dr. Angela Little from the University of California Berkeley and others provide strategies for integrating the concept of growth mindsets into instruction. They discuss the advantages of creating a climate in which students feel as though they have the ability to learn anything even if they originally did not have confidence in a certain area of study.
- Growth Mindset and its Role in Practice and Feedback: STEM Skills and Study Rubric [08:45] – Dr. Angela Little from the University of California Berkeley introduces a tool to help instructors support students in identifying areas in need of improvement as well as identify strategies for providing constructive feedback to students. She goes on to discuss this tool with an instructor that uses this tool and a student who has experience with this tool.
- Growth Mindset and its Role in Practice and Feedback: Students' Decisions to Major [04:24] - Dr. Angela Little from the University of California Berkeley discusses the information students use to determine which field of study they would like to enter. She also addresses how the student's mindset can influence their interpretation of that information and affect their decision. Finally, how the mindset of the faculty the students interact with can affect their decision as well.
- Research Based Surveys: Concept Inventories [9:56] - Dr. Angela Little from the University of California Berkeley and others introduce the concept of research based surveys. She mentions several different types of surveys instructors can use to get feedback from students to improve their instruction. They go on to describe the first type of survey known as concept inventories.
- Research Based Surveys: Using Surveys in Practice [3:49] - Dr. Angela Little from the University of California Berkeley and others discuss how they use research based surveys in the courses they teach.
- Research Based Surveys: Attitudes/Beliefs Surveys [05:34] - Dr. Angela Little from the University of California Berkeley and others introduce surveys that identify student's attitudes and perceptions regarding a field of study. They discuss the advantages of moving students from a "novice-like" perception of a subject to an "expert-like" perception as well as how this transition can be made.
- Rubrics and Feedback Codes [04:10] - Dr. Angela Little from the University of California Berkeley and others introduce the concept of feedback codes. They discuss how instructors can develop codes that correspond to a common comment that applies to multiple students. This allows the instructor to provide a significant amount of feedback on assignments without significantly adding to their workload.

Online Discussion Questions

- Warm-Up - Take a few minutes to write about a time when you felt proud of an accomplishment in STEM (e.g. research project or course assignment) and then again in a context outside of STEM. Describe the kind of feedback you received during those processes. Who did the feedback come from?
- Analysis Questions – As mentioned in the video, one strategy for generating multiple-choice questions higher up on Bloom's Taxonomy is to ask students to analyze real (or fake, but plausible) data sets. Describe a research paper or other source of data that you might be able to adapt into a multiple-choice question for an introductory course in your discipline. What might

that assessment question look like?

- **Revising Expectations** – In the video, we learned that many students underestimate the amount of time it takes to solve math problems. How might you use open-ended problems to provide students with feedback that would help them revise this expectation and develop the persistence they'll need to succeed in math? What other incorrect expectations do students have that could be addressed through open-ended problems and related feedback to students?
- **Not Giving “The Answer”** – In your own teaching or tutoring experience: Have you ever struggled with wanting to give students “the answer?” Do you have some general strategies around when you choose to lead students and when you choose to step back?
- **Working with Student Ideas** – Which of the strategies mentioned in the video for working with student ideas surfaced during open-ended problems appeals to you? What other methods might you use to respond meaningfully to student “ideas in process”?
- **Growth Mindset** – Consider how you approach learning in your discipline? Do you have a growth or fixed mindset? Has that changed over time? If so, what led to that change? Are there other areas in your life where you have different mindsets?
- **Applying the Growth Mindset** – Given the importance of helping students develop growth mindsets, how might you do so through assessment activities, both formative and summative? What might be challenging about changing one's students' mindsets from fixed to growth?

Online Supplemental Activities

- **Interview Activity** – Choose an open-ended question, find a non-specialist to ask your question, then use strategies mentioned in the video to draw out your interviewee's ideas. Share your experience in the forums. See the activity for details. [Supplemental]
- **Growth Mindset Activity** – First, draft feedback you might provide a student struggling with developing his STEM learning skills. Then, use a rubric focused on STEM learning skills to evaluate your own mindset. See the activity for details. [Supplemental]

Activities for the MCLC In-person Sessions

Module 4: Assessment and Feedback

Learning goals for MCLC in-person sessions

Articulate the many kinds of STEM skills important to succeeding in STEM courses and reflect on how to assess and provide concrete advice around these skills.

Apply principles around how to listen to and draw out student ideas

Note: As an MCLC, you may be more interested in one of the video topics more than another. The activities below relate to videos 4 and 5. If these are not the topics that align most with your local learning goals, we suggest looking at the in-depth part of the other videos, outlined above, and building on those instead.

	Student Activity/Discussion	Facilitator Notes
Preparation for activity #1	<p>Have all of the students in your MCLC send you the question and concrete advice that they developed for the final peer graded assessment question. (“Describe a concrete STEM skill that introductory students are likely to be struggling with that might have led to poor exam performance. Then, write a question that you could ask students so that both you and the students could assess whether they are indeed struggling with this skill...come up with a concrete suggestion for improvement”).</p> <p>MOOC students were encouraged to draw on the STEM skills rubric handout, the STEM education literature, and their own personal experience and that of friends.</p>	

<p>Activity #1</p>	<p>Give each small group of 3-4 students one copy of all of the questions and a pair of scissors. Have them read through and sort the questions into groups (e.g., “content knowledge help” and “how to work on homework productively help”).</p> <p>Ask students to consider whether there are any groups missing and, if so, to develop one additional question and suggestion together.</p> <p>Have small groups share out their groupings and any additional questions.</p>	<p>(~20-30 minutes)</p> <p>Collect any new ideas developed in class. Then, send out a joint document to all of the MCLC students with both their peer-assessment MOOC questions and the in-class questions as a resource guide that they can use. Graduate student TAs sometimes find this particularly helpful in fielding questions from their students about why they did poorly on their first midterm.</p> <p>If you decide to do this activity, we have a forum where you can post your guide as a resource to others.</p>
<p>Activity #2</p>	<p>See the 5-10 minute mini interview project handout (next page)</p> <p>Small groups: (ideally, small groups will all have chosen the same open-ended question or at least be in a common discipline)</p> <p>Have each small group member go around and state (1) an interesting piece of knowledge that was brought up in their interview and (2) one improvement they might make to using this questioning technique in the future. (10-15 min)</p> <p>Have each small group share out 2 take-aways with the large group. (10-15 min)</p>	<p>(~20-30 minute in-class activity, plus 15-20 minutes of homework.)</p> <p>Have each small group pick a “scribe” who will be in charge of taking notes. Give each small group either a large sticky-note or a small white board on which they’ll have to write their two take-aways. Encourage them to draw diagrams if appropriate.</p> <p>The course discussion forums include a forum for sharing experiences with this interview activity. Recruit one or more of your participants to share a few observations from your in-person activity on that forum, so that online participants can learn from your experiences.</p>
<p>Connections to current or former instructional experiences</p>	<p>Discussion topic #1 asks students to think deeply about the skills important to succeeding in STEM, both from their own personal experiences, but also understanding the range of student experiences.</p>	<p>.</p>

Additional Activity

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Activity #2, Mini Interview Project Activity: Listening to and Drawing Out Student Ideas
(Paired with video 4, part 1)

(A) Take your free response or multiple-choice question that you're developing for your peer assessment. If it's very specific, then develop a more open-ended version of it. *For instance, if your question was, "what is Newton's 2nd law?," you could ask a more general question like, "when you think of the word force, what comes to mind? When do you use it in day-to-day conversation?"* Or, choose a different open-ended question that you're interested in exploring.

(B) Name one strategy for drawing out student ideas from Helen's first time TA experience case study.

(C) Now, it's time to do some research: go out and ask your open-ended question for at least 5-10 minutes to a real person who isn't a STEM major (could be in-person or online, though in-person is recommended), or an introductory STEM student who isn't in your course if you're teaching one*. Family and friends are fine.

**This request is so that you don't have any vested interest in your interviewee needing to get somewhere in particular during your conversation.*

Practice at least one of Helen's strategies for drawing out ideas and not leading in any particular direction. A few notes:

- *If the person wants you to tell them more about your topic, that's fine, but request that during the 5-10 original minutes, that you're simply trying to understand how they're thinking about the question for a mini research project, and so you're not going to lead them in any particular direction.*
- *It is important to emphasize that you're not judging their ideas. Mention that you're just trying to understand how people might approach this open-ended problem and there's lots of productive ways to do so. Mention that you don't expect them to get to any "answer" because there isn't a ton of time to talk.*
- *Take notes about their ideas. Then answer:*

(A) What knowledge did the person bring up? What knowledge seemed like it could be productive for students to bring into thinking about this topic? What knowledge might need to be further re-examined by students to better make sense of the topic?

(B) How do you think you did with respect to drawing out your interviewee's ideas? What evidence do you have for this? Is there anything you would improve next time you tried to talk to someone and understand how they're thinking about a topic?

(C) In the case that you really struggled to draw out student knowledge, but you tried to talk to your interviewee for 5-10 minutes: Explain what went wrong and how you could improve for next time. The goal is to practice and be reflective. You could also try again if you have time.

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