Review of Online Module
Week 2: Principles of Learning, Part 2

Module 2: Feedback and Motivation

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Learning goals of the online module
1. Argue for the importance of providing students structured opportunities for practice and feedback
2. Describe differences in learning behaviors (strategic vs. deep) that can result from different student motivations (extrinsic vs. intrinsic).
3. Identify teaching strategies that
   a. Provide students formative assessment of their learning
   b. Foster intrinsic motivation and thus deeper learning

Description of main activities of online module
Online Videos
- Challenge Cycles in Engineering Pat 1 [06:42] – Dr. Anita Mahadevan-Jansen from Vanderbilt University provides insight into the difficulties a professor can face when using a traditional didactic approach to present difficult concepts and complex information.
- Practice, Feedback and Mastery [05:02] – Dr. Michele DiPietro from Kennesaw State University introduces the progression from initial practice to mastery in student learning.
- The Expert Blindspot [09:43] - Dr. Michele DiPietro from Kennesaw State University addresses the disconnect between possessing knowledge and conveying that knowledge to students. He presents the idea of an "expert blindpsot" in which educators overlook basic aspects of a given subject when teaching because it seems self-evident to the educator. He also discusses how acknowledging this blindspot can improve teaching practices as well as feedback provided to students.
- Structuring Practice, Providing Feedback: From Instructors [09:57] – Dr. Derek Bruff from Vanderbilt University provides multiple examples of the most effective forms of practice and feedback that educators can use in their courses.
- Structuring Practice, Providing Feedback: From Peers [06:41] - Dr. Derek Bruff from Vanderbilt University provides instructional strategies for peer to peer feedback along with research based justifications for the suggestions.
- Structuring Practice, Providing Feedback: For All Students [04:38] - Dr. Derek Bruff from Vanderbilt University discusses the concept that all students should have a chance to practice and receive feedback in each class. He provides several strategies concerning how educators can implement this concept in the allotted class time.
- Challenge Cycles in Engineering, Part 2 [09:55] - Dr. Anita Mahadevan-Jansen from Vanderbilt University discusses how she effectively implements challenge cycles in her biomedical engineering courses.

- Motivation Matters [02:44] – Multiple professors from this module discuss their experiences with student motivations in their courses.
- Motivating Students to Learn [07:10] - Dr. Derek Bruff from Vanderbilt University introduces the affective domain in education. He discusses different types of student motivations and how different motivations can result in changes in student behavior and performance.
- Motivation and Learning, Part 1 [07:16] - Dr. Derek Bruff from Vanderbilt University identifies several categories that underlie student motivations and how instructors can take advantage of student motivations to improve as educators.
- Motivation and Learning, Part 2 [08:48] - Dr. Derek Bruff from Vanderbilt University provides an in depth discussion of how instructors can leverage student motivations to increase interest in a course and therefore improve knowledge acquisition and performance.
- Shane Hutson, Introductory Physics [07:47] – Dr. Shane Hutson from Vanderbilt University discusses his teaching strategies, the organization of his courses and what he has found to be most effective in his teaching.
- Margaret Rubega, Ornithology [09:12] – Dr. Margaret Rubega from the University of Connecticut discusses her teaching strategies, the organization of her courses and what she has found to be most effective in her teaching.
- Andrew West, Alien Worlds [08:53] – Dr. Andrew West from Boston University discusses his teaching strategies, the organization of one of his most popular astronomy courses and what he has found to be most effective in his teaching.
- Persistence in STEM Fields, Part 1 [08:10] – Dr. Mark Connolly from the University of Wisconsin Madison discusses the trend for students to leave STEM fields of study as they progress into higher education. He provides research based explanations concerning the declining numbers of STEM students as they progress through higher education.
- Persistence in STEM Fields, Part 2 [04:17] – Dr. Mark Connolly from the University of Wisconsin Madison addresses the motivation of students who either stay in STEM fields of study or move away from STEM as well as instructional approaches that can keep students interested in STEM fields.

Online Discussion Questions
- Expert Blind Spots – Explore the notion of "unconscious competence" by selecting an everyday task in which you're an expert, like making a peanut butter sandwich or tying your shoelaces. Write detailed instructions for the task you've selected and share them here on the forums. Was it challenging to articulate what you usually do unconsciously?
- Why So Much Lecture? – Given the importance of practice and feedback to learning, why do you think lectures are so common in undergraduate STEM classrooms? What barriers do you see to the adoption of more active learning techniques?
- Intrinsic Motivators – Describe a learning experience you've had that motivated you to continue in STEM. Which of these factors—competence, autonomy, purpose, and community—contributed most to your motivation during that experience? How so?
- Teaching Choices and Motivation – In what ways do the teaching choices described in the module's faculty interviews leverage the intrinsic motivators of competence, autonomy, purpose, and community?

- Talking about Leaving – Suppose you hear the following statements in response to the news that as many as 40% of undergraduates who start as STEM majors switch to non-STEM fields: (A) "Some students just don't have what it takes to major in STEM." (B) "You know, if students find something else they like better, that's fine with me." Given what you've learned about the *Talking about Leaving* study, how would you respond to these statements? [Supplemental]
- Majors and Non-Majors – The *Talking about Leaving* study explored reasons students switch out of STEM majors, but two of the three faculty interviews in this module focused on courses for non-majors. In what ways should our strategies for motivating students in major courses differ the strategies we use in non-major courses? Or should our major courses use more of the strategies typically seen in non-major courses? [Supplemental]

Activities for the MCLC In-person Sessions
Module 2: Feedback and Motivation

Learning goals for MCLC in-person sessions

1. Identify relationships among key concepts from Weeks 1 and 2 (prior knowledge, knowledge organizations, practice and feedback, student motivation).
2. Describe teaching practices that leverage one or more of these key learning principles.

	Student Activity/Discussion	Facilitator Notes
Warm-up	List the four learning principles discussed in Weeks 1 and 2: prior knowledge, knowledge organizations, practice and feedback, and motivation. Have participants respond to the following questions (using clickers or a service like Poll Everywhere, if available): 1. Which of these principles felt most intuitive to you? That is, which one do you think you have already built into your understanding of learning? 2. Which of these principles do you expect to be most challenging to implement in your teaching? Look for and discuss patterns in the participants' responses.	You might have participants share their individual reasons for their answers to these questions, but discussing patterns in participant responses might be more interesting. For instance, if "practice and feedback" is the most common response to Question 1, ask participants why they think that principle makes so much sense to (future) STEM faculty. Or, if "knowledge organizations" is the least common response to Question 1, ask participants why (future) STEM faculty don't find that principle intuitive. Similarly, if "motivation" is the most common response to Question 2, ask participants why that's such a challenging principle to implement.
Activity #1	Make sure each participant has pencil and paper. Ask participants to take a few minutes and draw a concept map for Weeks 1 and 2 of the course. The four learning principles should be on each concept map, but what other key concepts should be there? And how are these concepts related? Have participants draw their own concept maps, then pair up to compare and contrast concept maps. Then move to whole-group discussion, asking participants to share what they found interesting or useful about *their partner's* concept map. If feasible, have participants share a few concept maps with the whole group, using a document camera or other technique.	Be sure to step back and process the concept map activity itself as an example of helping learners develop more robust knowledge organizations. How did drawing and sharing your concept map help you see connections among topics? Were there ways the concept map was challenging or insufficient or seemed to miss crucial elements of the module's material? How might you modify this activity for use in a STEM classroom?

		You might draw your own concept map before your meeting and share it with your participants after they've had a chance to draw, share, and discuss their own. Pencil and paper works great for this, but if you want to use some other concept mapping technology, that's fine, too. Just be mindful of the time it will take for your participants to learn new technologies. Prezi makes a great concept mapping tool, and it allows up to ten users to edit the same file, facilitating collaborative concept mapping.
Activity #2	Jigsaw! Split your participants into four groups and assign each group one of the four learning principles discussed in Weeks 1 and 2. Each group's task is to decide on one or two teaching strategies or activities that would implement their assigned learning principle. Each group member should be prepared to describe their chosen teaching strategies and how it implements their principle. Then shuffle the groups to form four new groups, where each new group has a mix of individuals from the first set of groups. (This activity works best with 16 participants, so that each new group has exactly one member from each old group. However, the activity can be adapted for smaller or larger groups.) In the new groups, each member should report out from the first set of groups. Then reconvene the whole group and try to identify teaching strategies that implement more than one of the principles.	This activity is designed for participants who want to focus on teaching strategies and classroom practice. The first set of groups are welcome to discuss teaching strategies shared in the module, but they're also welcome to bring in other teaching strategies with which they're familiar. The focus should be on approaches to teaching that are practical in the kinds of teaching situations the participants expect to be in. This might mean adapting a teaching strategy to make it more relevant or practical. If you'd like to give the second set of groups a bit more focus, you can ask them to select the one most useful teaching strategy shared by individual members. Have the second set of groups report out on these "most likely to succeed" teaching strategies.
Wrap-up	Encourage your participants to explore the course's online learning community. They're likely to encounter something useful from a fellow learner with a different perspective.	During an earlier offering of this course, we found that many local learning community participants didn't engage with the "global" learning community convened by the course. There's some sense to

		that—why look for a conversation with someone a thousand miles away when you can engage with colleagues locally—but it's also a lost opportunity to learn through diversity. Look for networked learning activities within the course designed to develop your participants' skills in learning from others online.