Apply and Analyze

When you want your students to apply and analyze the material, active learning should become a more prominent feature of your pedagogy with some lecturing to provide the foundation needed for engagement at this level.

- **Draw Connections Among Ideas**
- **Activities That Use Information in New Situations**

Draw Connections Among Ideas

Learning results from a combination of reflecting on and making connections between prior experiences, and new experiences and content. It involves organizing and reorganizing these connections and relationships into mental models that can get more sophisticated as learners gain experiences. It is influenced by learner's motivation to learn and interests in the material to be learned.

As many have experienced in their own learning and teaching, conversation plays a key role in facilitating social interactions around learning and assisting in meaning making for ideas and concepts. Learning occurs through discourse within social interactions (Rogoff, 1998; Vygotsky, 1978). For learners, engaging in conversations can foster more generative thinking and enable them to practice dialogic skills, such as asking questions and communicating ideas in an effective manner. It can be a way for them to process information and make social connections. These thinking and dialogue skills form the basis of active, analytic, individual thought, and allows individuals to develop their ability to communicate their ideas.

It’s important to keep in mind that talking about conversation starts us thinking about other aspects of a learner’s culture that can influence learning. The culture of the learner can be the culture of a society, ethnic group, or a country and also includes the culture of the classroom, family, group of friends and the resulting activities, routines and common experiences that people in each of those communities has. Each of these cultural components can influence the ways that ideas are conceptualized, modeled, and understood.

Activities That Use Information in New Situations

With the aim to provide both the students and instructor with a gauge of where their level of understanding is at a current moment, formative evaluation activities enable the instructor to adjust accordingly to meet the emerging needs of the class. Do I need to re-explain that concept differently? Do I need to backtrack two steps and catch everyone up to where we are now? Do I need to change my pedagogical approach to engage this group of students?

Formative evaluations are particularly important because they allow you to make changes that affect the current students, while the end of term forms only affect future classes. In addition, formative evaluations signal your class that you are indeed interested in what and how they're learning, and in their responses to your teaching.

Some examples of Formative Evaluations:

One-Minute Paper

Check student understanding in a lesson by asking them to take out a sheet of paper and take one minute to, for example, write down an explanation of a concept, solve an equation, or draw a main point from a reading.

Muddiest Point Paper

Check student understanding in a lesson by asking them to take out a sheet of paper and take one minute to write down a single question about, or the most confusing aspect of, the topic of/for the day.

Directed Paraphrase

After working through a topic, ask students to explain the content to a lay audience in their own words.

Mid-Semester Evaluation

In order to conduct a mid-semester evaluation, you might want to use the generic mid-semester evaluation or modify it in any way; there may be particular additional questions you would like to ask, for instance. If you do use some form of mid-term evaluation, we encourage you to discuss the results with your class, explaining for instance, why you can't cut down on some topic, or why, based on the suggestions of the class, you will add a discussion of a particular topic.

Create and Evaluate

When your students are ready to create and evaluate within the course topic, active learning should be the primary feature of your pedagogy.

- **Group/Team-Based Learning**
- **Problem-Based Learning**

Group/Team-Based Learning

Group/Team-Based Learning (sometimes referred to as Cooperative Learning) is "a highly structured form of group work that focuses on the problem solving that-when directed by an effective teacher-can lead to deep learning, critical thinking, and genuine paradigm shifts in students' thinking."

- Millis, B. J. (Ed.). (2010). *Cooperative learning in higher education: Across the disciplines, across the academy*. Stylus. p. 5

The literature references two key elements for any successful group/team-based learning activity:

1. Positive interdependence - student groups/teams are formed around a given task that they could not complete adequately on their own. This means that students enter and engage in the group/team with a vested interest in working together.
2. Individual accountability - students receive the grades they earn separate from the group product evaluation. The group product may be assigned a group grade, but each individual student's grade also takes into account the work of that individual student. (i.e., students can submit a peer critique of other group members' to be considered in assigning individual grades).

The key to using Group/Team-Based Learning effectively lies in understanding basic principles of team dynamics (setting up the context for individuals to "need" others in order to complete the project) and then applying those principles with specific subject matter to achieve the kinds of student learning not possible individually.

Problem-Based Learning

"Problem-Based Learning (PBL) as it is generally known today evolved from innovative health sciences curricula introduced in North America over 30 years ago. Medical education, with its intensive pattern of basic science lectures followed by an equally exhaustive clinical teaching program, was rapidly becoming an ineffective and inhumane way to prepare students, given the explosion in medical information and new technology and the rapidly changing demands of future practice. [PBL was developed] not only as a specific instructional method but also as central to [a] philosophy for structuring an entire curriculum promoting student-centered, multidisciplinary education, and lifelong learning."

- Boud, D., & Feletti, G. (1997). The challenge of problem-based learning (2nd ed.). London: Kogan Page. p. 2

If you wish your students could learn to apply a process that relies on a combination of hypothetical-deductive reasoning and expert knowledge in multiple domains, PBL is an ideal learning model to adopt (*Savery, J. R. (2006). Overview of Problem-based Learning: Definitions and Distinction. Interdisciplinary Journal of Problem-based Learning, 1(1)*). PBL is a learner-centered approach in which students learn through instructor facilitated problem solving that asks students to conduct research, integrate theory and practice, and apply knowledge and skills to develop a reasonable solution to a complex problem. Students often work in collaborate groups to identify, engage and apply new knowledge to the problem, ultimately reflecting on what they have learned.

The success of PBL is dependent upon the following factors (as described in *Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? Educational Psychology Review, 16(3), 235-266*):

1. Students must have responsibility for their own learning.
2. The problems addressed in PBL must allow for free inquiry.
3. Learning should be integrated because multiple perspectives lead to a more thorough understanding of the issues and the development of a more robust solution.
4. Collaboration is essential.
5. What students learn through self-directed aspects of the work should be shared with the group and how that information might impact the development of a solution to the problem.
6. A closing analysis of what has been learned and reflection on what they know, what they learned, and how they performed.
7. The activities carried out in PBL must be authentic to the real world.
8. Student learning should be evaluated by progress towards the goals of problem-based learning.