This morning’s session

• Students as learners
  Scenario discussion
• Course design process
  o Course context
  o Goals
    Writing goals exercise
  o Activities
    Jigsaw activity
  o Assessment & Feedback
• Reflection
1. Individually, read one of the scenarios.

2. As a table, discuss the problems.

3. Guided discussion among all.
Many students need our help in “learning to learn”

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From K. Wirth with data from Schoenfeld (1987) Mathematical Problem Solving

Novice → Expert
We can help students learn by how we design our courses.

One Course Design Process

• Consider **course context**
• Articulate **goals**
• Design **activities**
• Plan **assessment & feedback**

Figure modified from D. McConnell

http://serc.carleton.edu/NAGTWorkshops/coursedesign/tutorial/index.html
Focus on one of your courses
Consider course context

Each class has a different context. These differences influence the course design.

- **Students**
  - undergrad, grad, majors?
- **Motivation**
  - required, elective, gen-ed?
- **Class size**
  - <10, 10-50, 50-100, >100?
- **Format**
  - lecture, lecture + lab, studio, project-based, seminar, flipped?
Goals-based approach

**Emphasizes designing a course for which**

- Students learn significant content & skills
- Students practice thinking & solving problems
- Students leave prepared to apply knowledge & skills

**Sets goals that**

- Are student centered
- Involve higher-order thinking skills
- Can be assessed through problem sets, papers, projects, exams…
Discussion: Hydrology Course Goals

Students should be able to…

1. interpret hydrological processes based on available maps and data.
2. design a study to predict how future disturbances may alter hydrologic systems.
3. develop a conceptual model that solves a problem and uses mathematical relations to quantify the solution.
4. predict the effect of heterogeneity on groundwater flow patterns in an unfamiliar setting.
5. critically review journal articles.

http://serc.carleton.edu/NAGTWorkshops/hydrogeo/goals.html
Goals

What do you want students to be able to do as a result of taking your course?

• What do you do?
• What problems should students be able to solve?
• How might students apply what they have learned?
• How will they be different at the end of the course?
What goals will you set for your course?

• Consider & complete
  
  “When students have completed the course, they should be able to…”

• Try verbs such as
  
  derive, predict, analyze, design, interpret, synthesize, formulate, plan, correlate, evaluate, create, critique, adapt
Review goals

• Does the goal focus on higher-order thinking?

• Is the goal student-focused?

• Could you design an activity/assignment that will allow you to assess whether students have achieved the goal?
Course design

• Consider course context
• Articulate goals
• Design activities and assignments

*Students learn when they are actively engaged in practice, application, and problem solving.*

(NRC, 1999 *How People Learn*)

• Plan assessment & feedback
Active learning methods promote

- Higher order thinking
- Metacognition (thinking about thinking)
- Social Interaction
- Quick feedback
- Active engagement with the material
Active learning method: Jigsaw

From Barbara Tewksbury
http://serc.carleton.edu/NAGTWorkshops/teaching_methods/jigsaws/index.html
Jigsaw Examples

• **Plate tectonics:** Teams analyze earthquake, volcano, seafloor age, and topographic maps, then combine to draw plate boundaries and interpret processes.

• **Google Earth:** Teams analyze different locations that show similar features (e.g., barrier islands, folds, valley glaciers, volcanic cones, etc.), then combine to discuss similarities and differences of the feature.

http://serc.carleton.edu/sp/library/jigsaws/examples.html
Your turn: Jigsaw on active learning
Part I (Teams analyze...)

Count off 1-7 at your table. Move to the poster that corresponds with your number.

Talk to your poster team members:

- When would the technique be especially useful?
- For what courses/topics might the technique not work as well?
- How much preparation before class does the technique require?
Your turn: Jigsaw on active learning
Part II (then combine…)

Return to your table and as a group:

Briefly describe each method.

Rank the methods by time required for preparation.

To help students use maps or interpret graphs, plan 3 activities that use different active learning methods.
Active learning supports metacognition

Three basic steps to teaching students metacognition:

1. Teach students that their ability to learn can be changed.
2. Teach planning & goal-setting.
3. Provide students opportunities to monitor and adapt their learning.

Summarized from Lovett, 2008, Educause Learning Initiative Conference

http://serc.carleton.edu/NAGTWorkshops/metacognition/index.html
Assessment & Feedback

- Consider **course context**
- Articulate **goals**
- Design **activities**
- Plan **assessment & feedback**
  - Formative assessment
  - Summative assessment
Assessment & Feedback

Formative assessment
Measures learning through low-stakes opportunities to help instructor adjust ongoing instruction to meet student needs

- Small group discussion
  Think-Pair-Share
- Concept/clicker questions (group vote/class meta-analysis)
- Student worksheets, minute papers

Provides opportunities for self-assessment

- Pause and write down.
- How do you know?
- What will you do differently next time?
- What questions do you have?
Summative assessment Measures learning at end of learning unit, accounts for a modest to large proportion of student grade

Homework assignments  Essays  Reports

Research Projects  Debates  Exams

Posters  Presentations
Assessment & Feedback

“FIDElity” Feedback

Frequent
When possible give (formative) feedback daily or weekly.

Immediate
Provide summative feedback soon after student work is completed.

Discriminating
Clearly explain differences between high/low scoring work.

Empathy
Show compassion for the students when delivering feedback.
Assessment & Feedback: Rubrics

"Learning increases when learners have a sense of what they are setting out to learn, a statement of explicit standards they must meet and a way of seeing what they have learned."

Loaker, Cromwell and O'Brien (1986)

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Rubrics improve consistency & efficiency when grading.

http://serc.carleton.edu/NAGTWorkshops/assess/rubrics.html
What is one thing you learned this morning that you want to apply to designing your courses?

Today, in our *Teaching Strategies* sessions and at our *Teaching Fair*, you will have opportunities to think about learning, teaching, and course design in more detail. What questions do you have? What would help you to plan your courses?