Course Design
Laura Rademacher and Kaatje Kraft

With material from Rachel Beane, Karen Kortz, Heather Macdonald, David McConnell, Barb Tewksbury, Karl Wirth & Richard Yuretich

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”

From K. Wirth with data from Schoenfeld (1987) Mathematical Problem Solving
Based on backwards design model from Wiggins & McTighe

Goals
(What do you want students to know?)

Activities
(What will they do?)

Assessment & Feedback
(How do you know?)

Individual Lesson Design

Course Context
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…

Diagram:
- Goals
  - Activities
    - Assessment & Feedback
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 (teach each other).

- Rank the methods by time required for preparation.

- To help students *use maps or interpret graphs*, list 3 activities that use different active learning methods.
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?
**Assessment & Feedback**

**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.

Adapted from Fink, 2003
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)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Exemplary</th>
<th>Good</th>
<th>Acceptable</th>
<th>Unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Figures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rubrics improve consistency & efficiency when grading.

http://serc.carleton.edu/NAGTWorkshops/assess/rubrics.html
Reflection

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?