Course Design

Martin Wong and Kaatje Kraft

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

By the end of this session you will be able to:

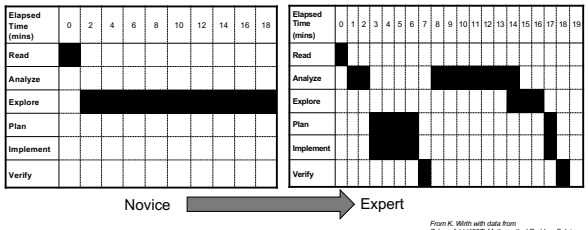
- Have the initial phases of developing a course through a backward design including:
  - Setting goals
  - Aligning activities with those goals
  - Considering how assessment and feedback can support student learning
- Actively engage in negotiating your understanding of how students learn
- Reflect on how this session connects to your teaching

Chuck Bailey photo

Scenario Discussion

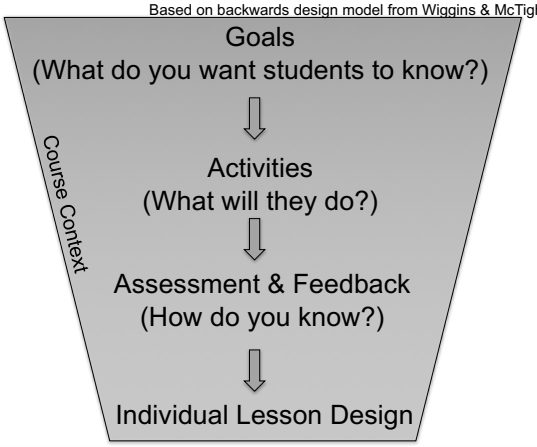
1. Individually, read one of the scenarios.
2. As a table, discuss the *problems*.
3. Guided discussion among all.

Many students need our help in "learning to learn"



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

Based on backwards design model from Wiggins & McTighe



Focus on one of <u>your</u> 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?

Photo by C. Ormsand, serc.carleton.edu

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

Discussion: Hydrology Course Goals

For your assigned goal(s) determine if they are:

1. Student Centered.
2. Higher ordered thinking skills (lower order skills are subsumed by higher ordered)
3. Assessable

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?
- How do you assure that the big ideas are emphasized over the minutia?

Photo by C. Field

What goals will you set for your course?

- Consider & complete

  "When students have completed the course, they should be able to…"

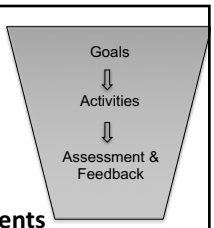
- Try verbs such as

  derive, predict, analyze, design, interpret, synthesize, formulate, plan, correlate, evaluate, create, critique, adapt

Review goals

- You will have the chance to provide/receive feedback from your peers.
  - Pass your notebook two people from your left
  - Read the goal and consider the following:
- 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?
  - After two minutes, you'll be asked to pass the notebook to your right.
  - Repeat the process
  - Pass again to the right, take one minute to read your feedback and discuss with each other

Course design



- Consider **course context**
- Articulate **goals**
- Design **activities and assignments**

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

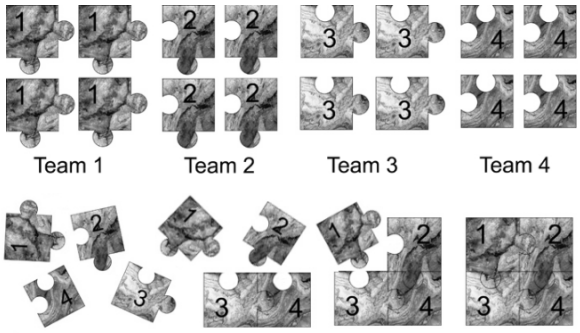
  (NRC, 1999 *How People Learn*)
- Plan **assessment & feedback**

Active learning methods promote

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

x

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…)*

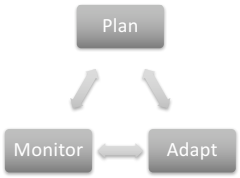
Return to your table and as a group:

- Briefly describe each method (teach each other).
- Rank the methods by time required for preparation. (after group consensus, place on a poster board)
- *If there's time:* Which methods the most useful for formative vs. summative assessment?

Active learning supports metacognition/self-regulation

Three basic steps to teaching students metacognition (self-regulation):

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)

Criteria	Exemplary	Good	Acceptable	Unacceptable
Organization				
Figures				
Interpretations				
…				

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?