Course Design
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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

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”

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/hydrogoals.html

Discussion: Hydrology Course Goals

For your assigned goal(s) determine if they are:
1. Student Centered.
2. Higher order thinking skills/deeper processing (lower order skills/surface processes are subsumed by higher order)
3. Assessable

http://serc.carleton.edu/NAGTWorkshops/hydrogoals.html

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

http://serc.carleton.edu/NAGTWorkshops/hydrogoals.html
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

![Jigsaw Diagram](http://serc.carleton.edu/NAGTWorkshops/teaching_methods/jigsaws/images.png)

- **Team 1**
- **Team 2**
- **Team 3**
- **Team 4**

Jigsaw Examples

- **Plate tectonics**: Teams analyze earthquake, volcano, seafloor age, and topographic maps, then combining 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 combining to discuss similarities and differences of the feature.

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 and be prepared to share with your table.

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: Discuss how you could apply one of these strategies to your course goal.
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, Education Research 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 votes, assessment 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

“FIDEility” 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

"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 (1998)

There are many ways this transparency in assessment can be provided:

- Rubrics
- Co-develop outcomes
- Provide model (or non-model) examples

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? What questions do you have? What would help you to plan your courses?

Today, in our Teaching Strategies sessions, you will have opportunities to think about learning, teaching, and course design in more detail.

![Diagram](Image)