Course Design

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

This morning's session

- **Students as learners**
  - *Scenario discussion*
- **Course design process**
  - Course context
  - Goals
    - *Writing goals exercise*
  - Activities
    - *Jigsaw activity*
  - Assessment & Feedback
- **Reflection**

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"

Elapsed Time (mins)	0	2	4	6	8	10	12	14	16	18
Read	■									
Analyze										
Explore		■	■	■	■	■	■	■	■	■
Plan										
Implement										
Verify										

Elapsed Time (mins)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Read	■																			
Analyze		■							■	■	■	■	■	■	■					
Explore															■	■				
Plan				■	■	■	■											■		
Implement				■	■	■	■											■		
Verify								■											■	

Novice → Expert

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

We can help students learn by how we design our courses

<u>One Course Design Process</u>

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

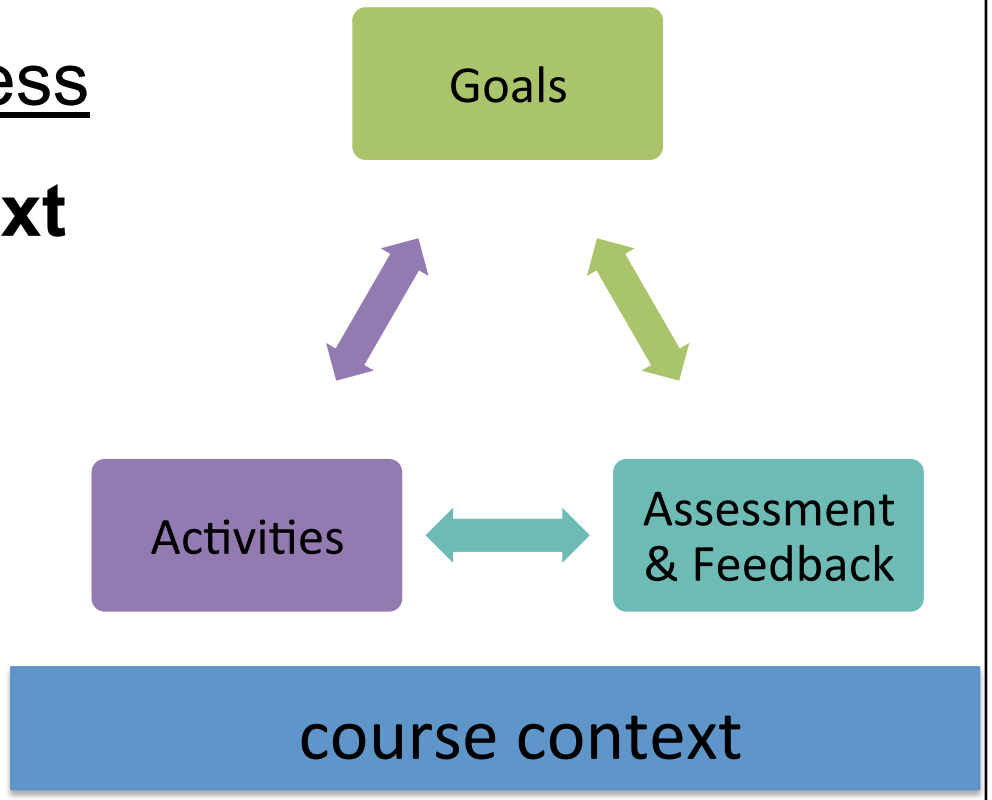


Figure modified from D. McConnell
Variation on Backward Design, Wiggens & McTighe (1998)

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?

Photo by C. Ormand, serc.carleton.edu

Goals-based approach

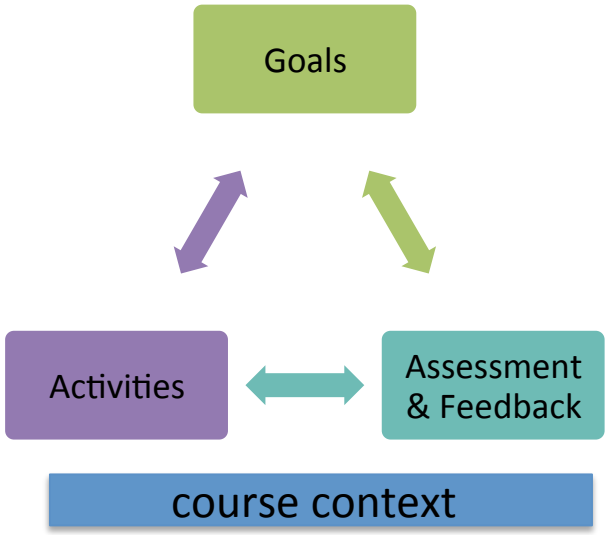
Emphasizes designing a course for which

- 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

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?

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…"

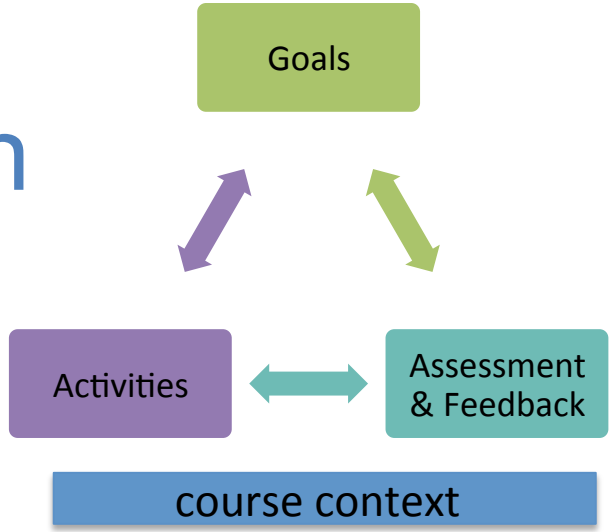
- Try verbs such as

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

Review goals

- 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**

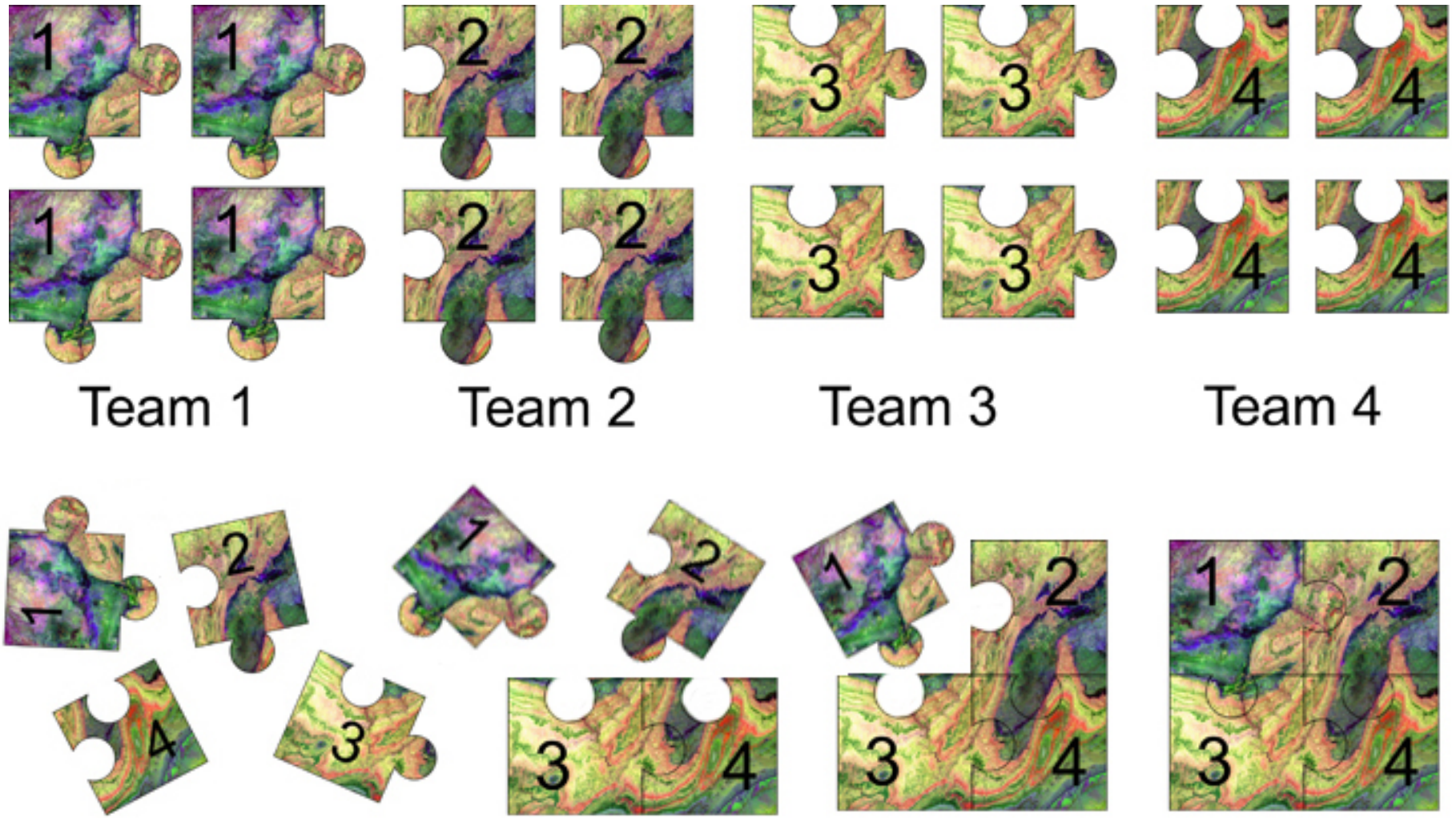
  Students learn when they are actively engaged in practice, application, and problem solving.

  (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.

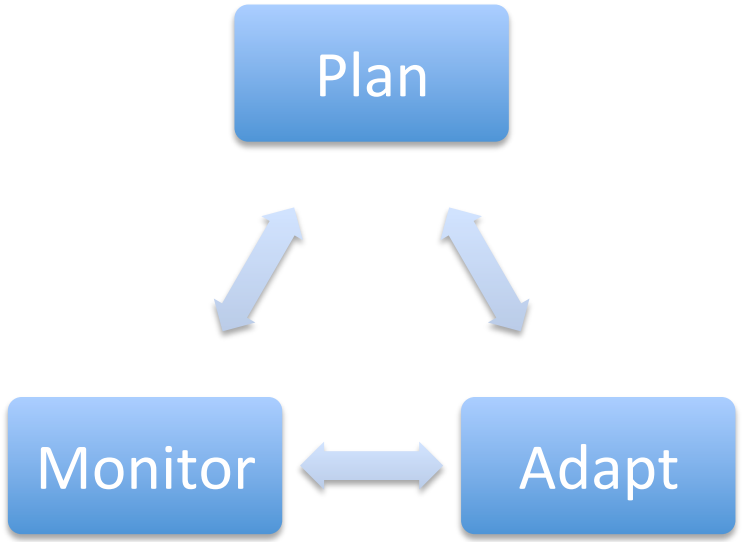
Active learning supports metacognition

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.

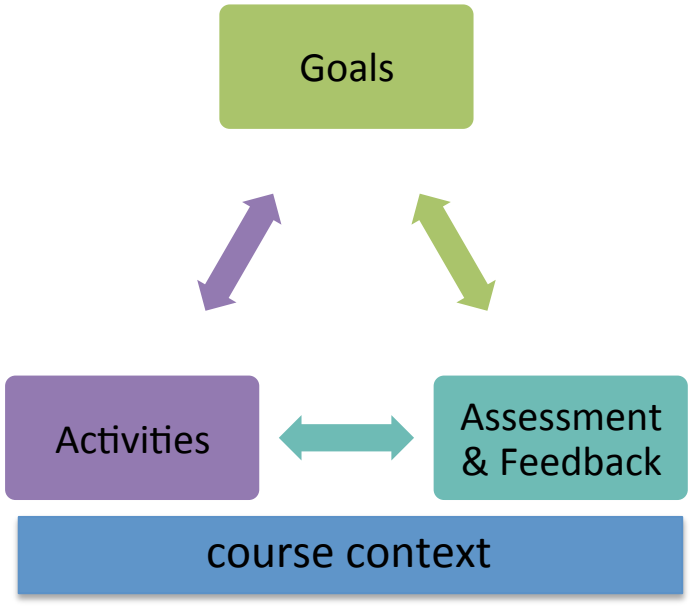


Summarized from Lovett, 2008, Educause Learning Initiative Conference

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

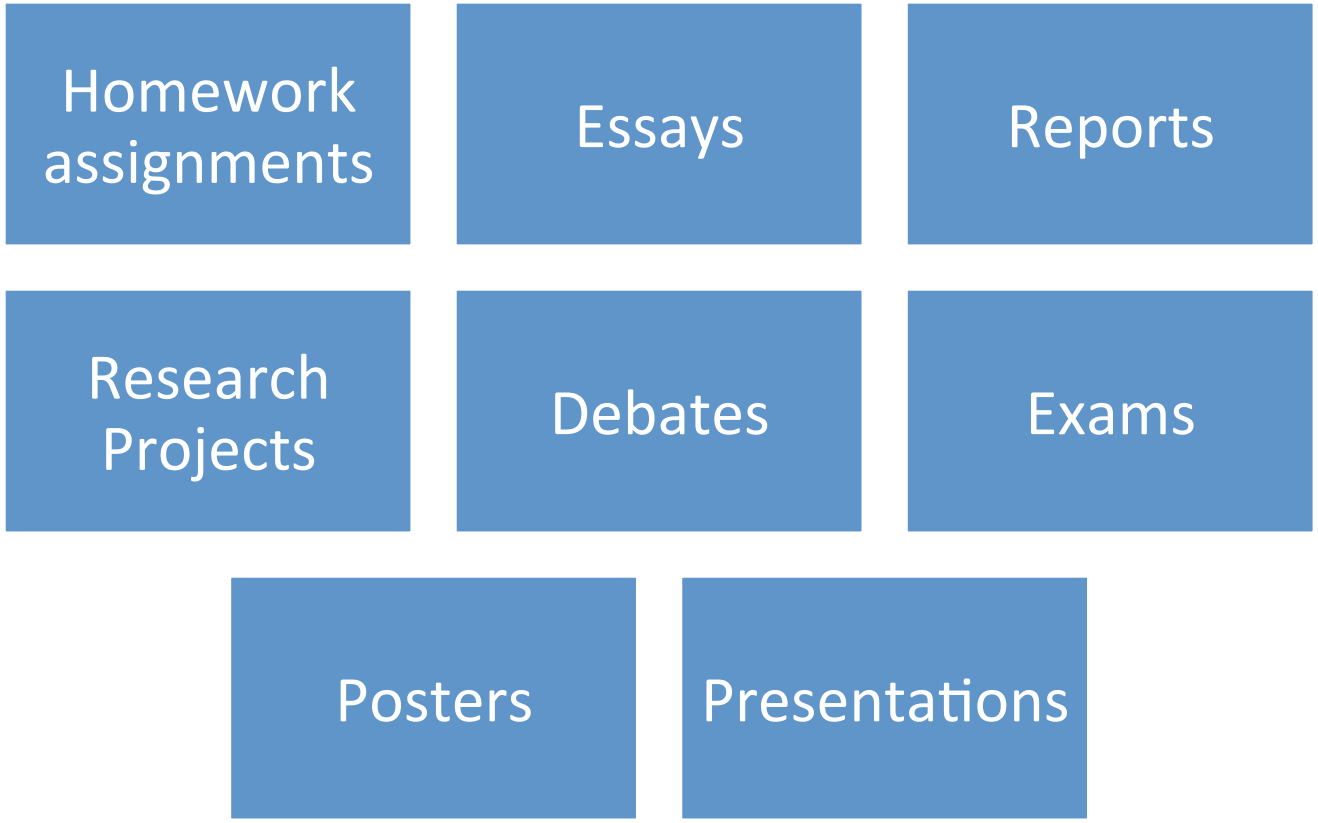
- Small group discussion Think-Pair-Share
- Concept/clicker questions (group vote/class meta-analysis)
- Student worksheets, minute papers

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?

Assessment & Feedback

Summative assessment Measures learning at end of learning unit, accounts for a modest to large proportion of student grade



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?