# Course Design

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

## ***This morning's session***

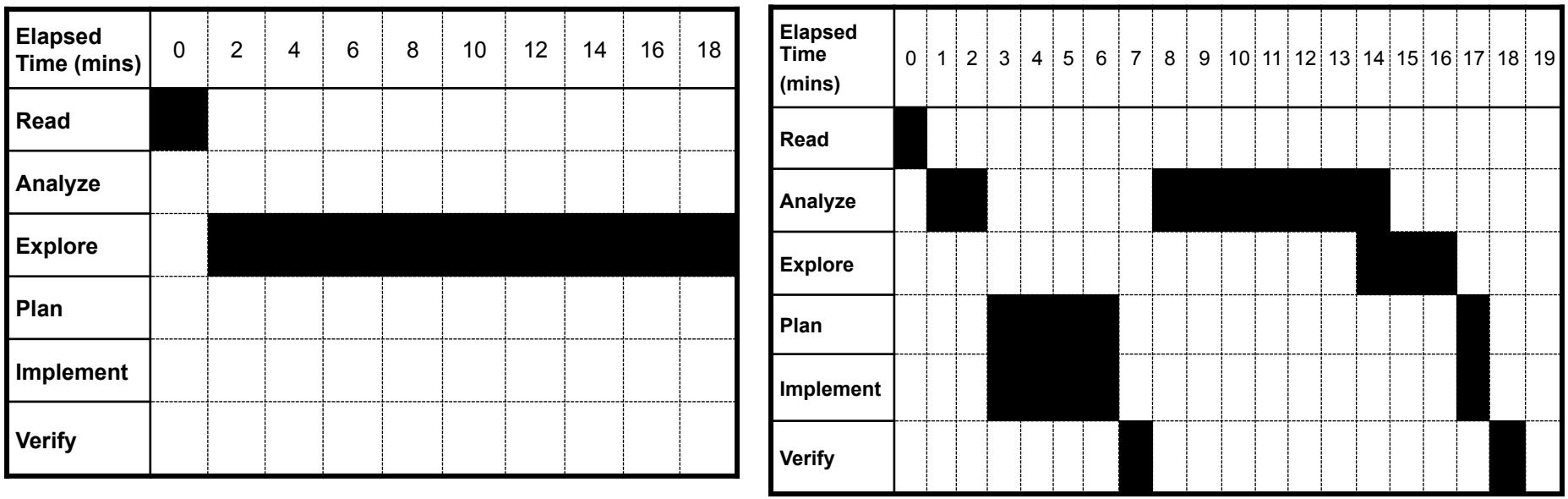
- **Students as learners**
  *Scenario discussion*
- **Course design process**
  - Course context
  - Goals
    *Writing goals exercise*
  - Activities
    *Jigsaw activity*
  - Assessment & Feedback
- **Reflection**

*Chuck Bailey photo*

# Scenario Discussion

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

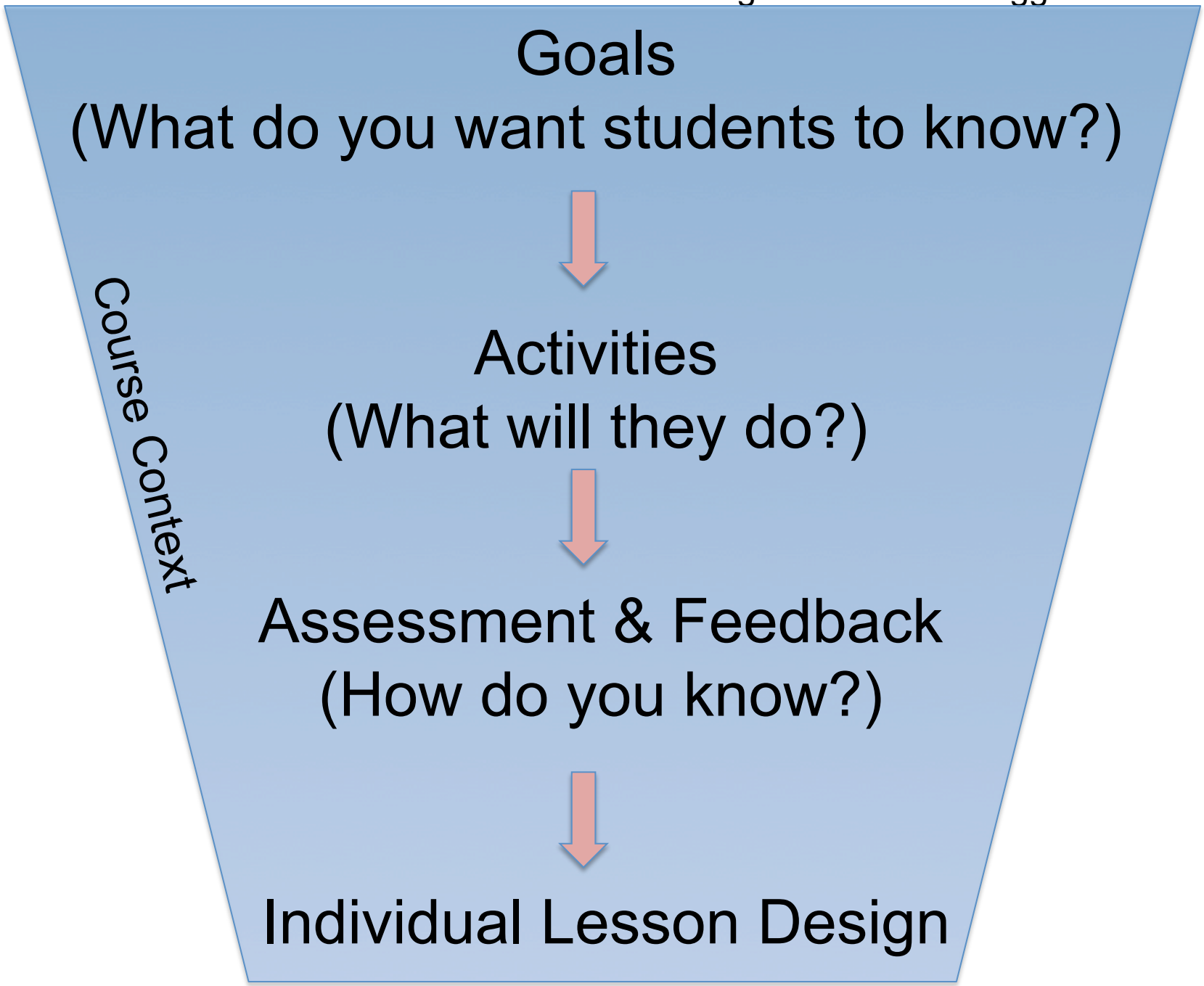
# Many students need our help in "learning to learn"




Novice → Expert

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

Based on backwards design model from Wiggins & McTighe



# 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…"

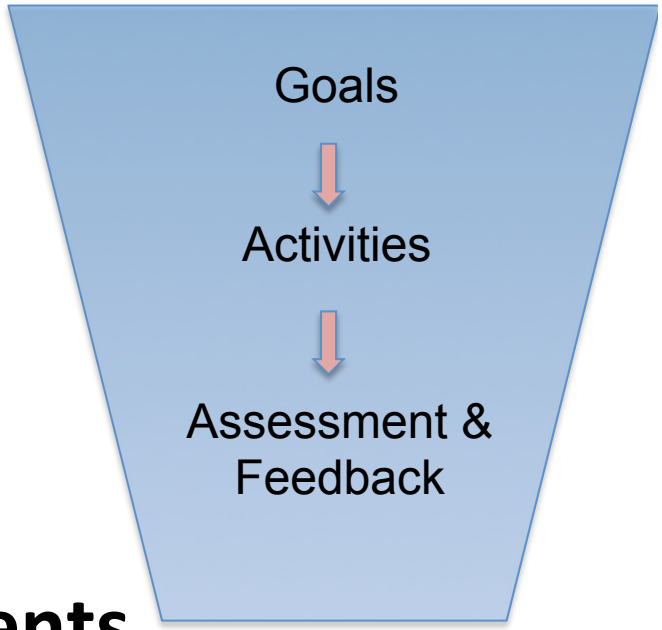
- Try verbs such as

  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**

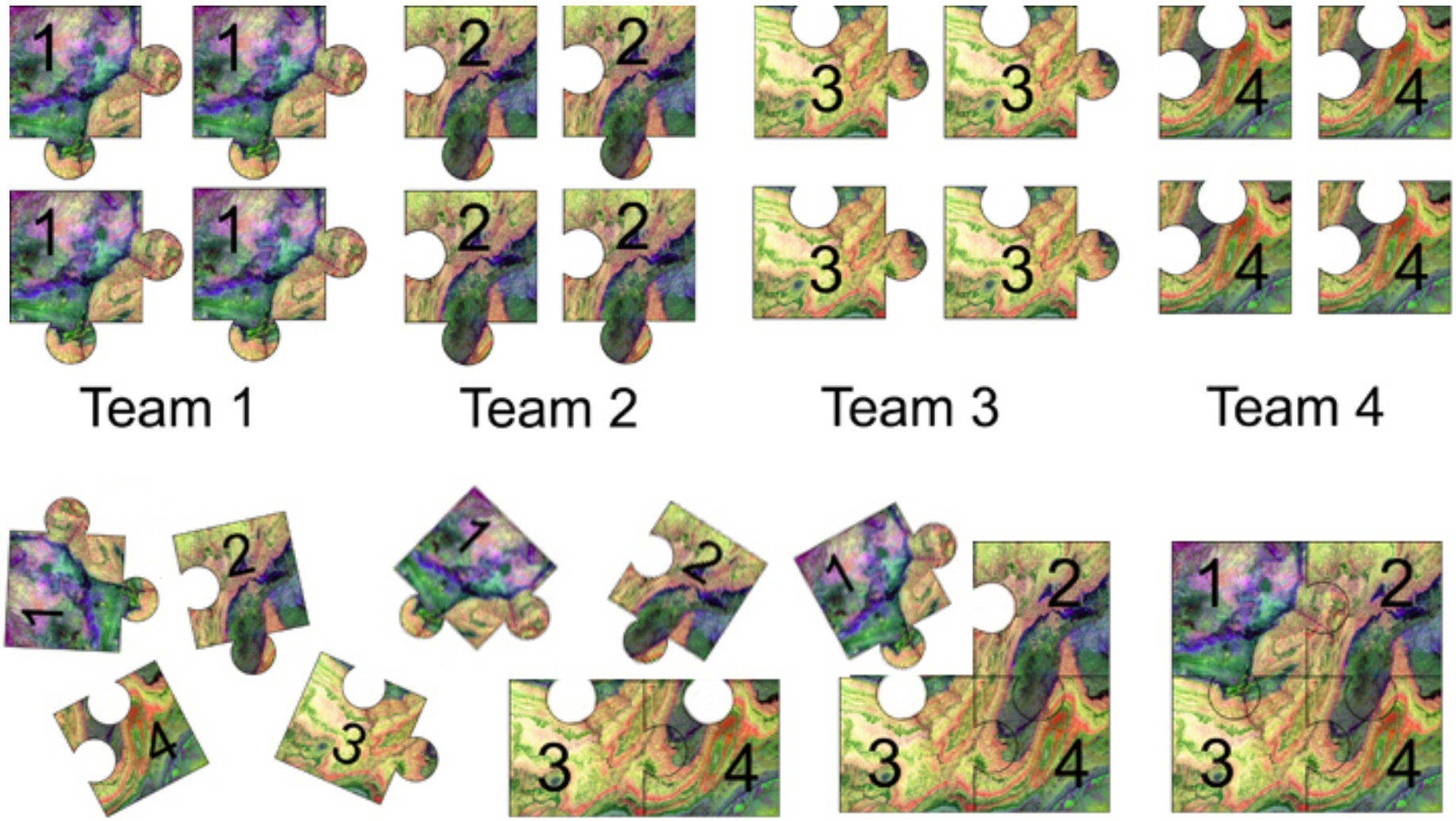
  *Students learn when they are actively engaged in practice, application, and problem solving.*

  (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.

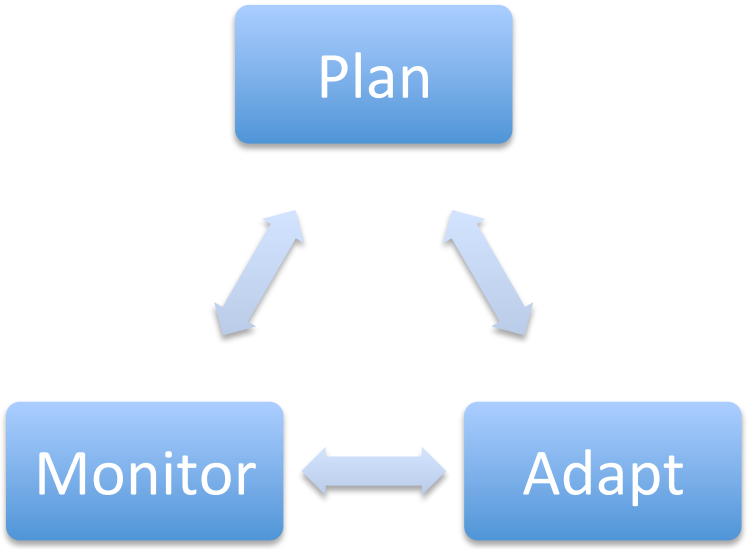
# Active learning supports metacognition

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

- 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?