Designing A Course
Learning, Teaching, and Assessment

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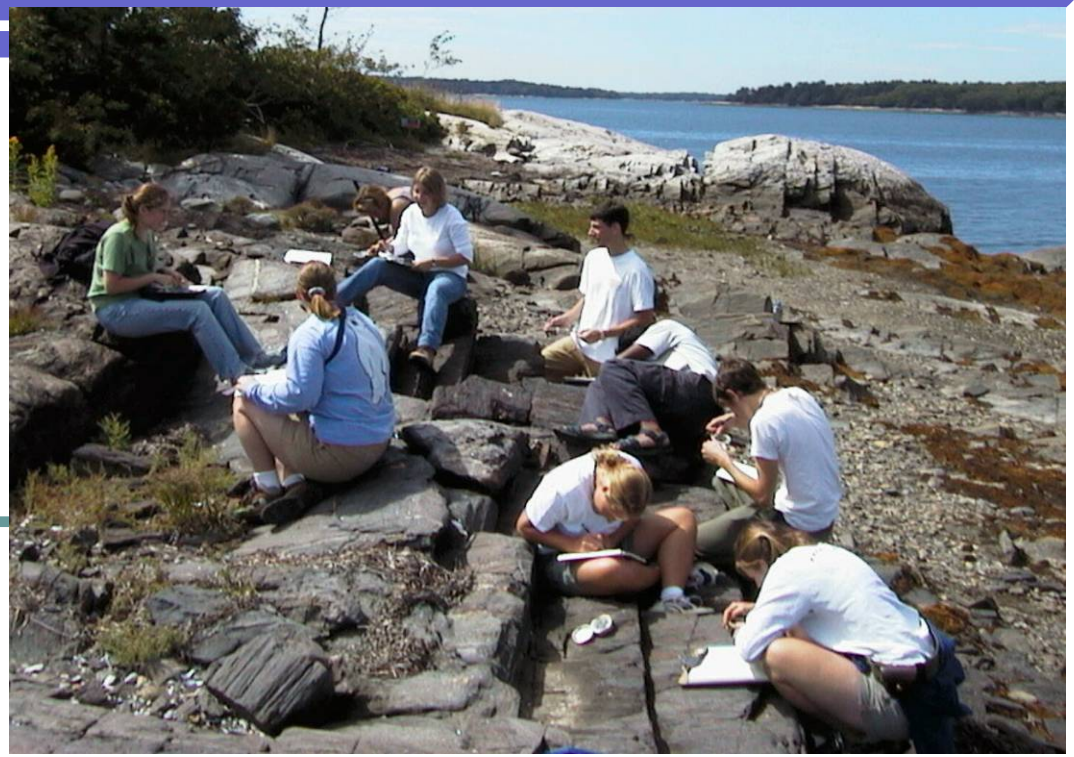


Focus on one of your courses

Viewpoint

- Content-centered
  - What will I cover?
- Learner-centered
  - What will they learn?

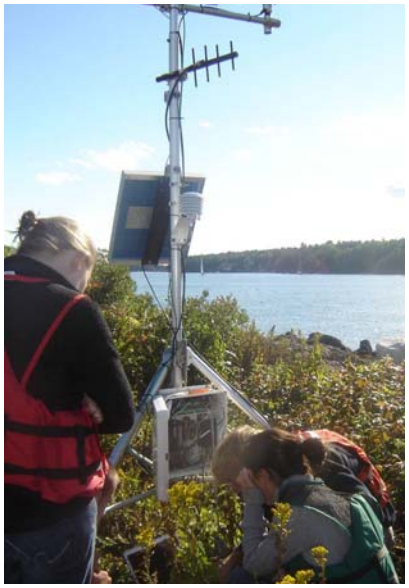
One Course Design Process

- Consider **course context and audience**
- Articulate **course goals**
- Design **activities and assignments**
- Plan **assessment**

http://serc.carleton.edu/NAGTWorkshops/**coursedesign/tutorial**/index.html

Consider Course Context & Audience

- General education course? Majors course?
- Required? Elective?
- What size is the course?
- Who are the students?
- What do they want to learn?
- How do they learn?
- *Your course context & audience?*



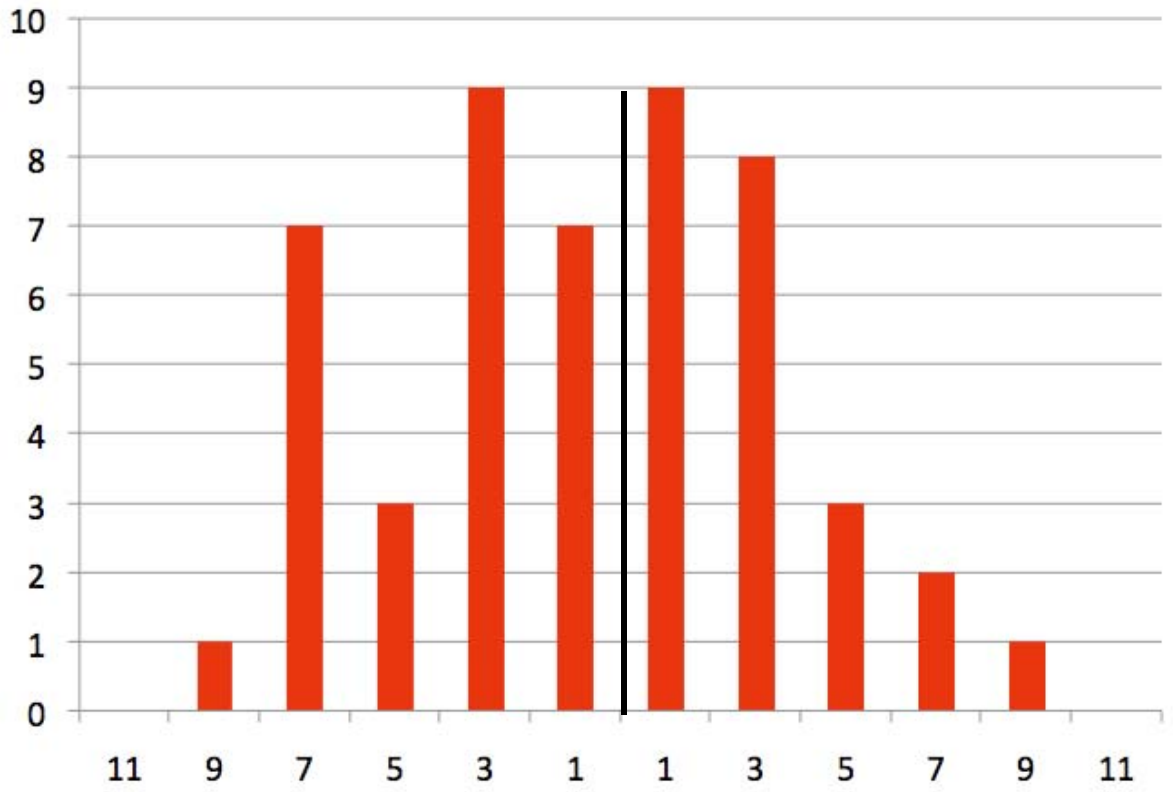
Learning Styles

How does the student prefer to process information?

- **Actively** – through engagement in physical activity or discussion
- **Reflectively** – through introspection

Learning Styles Questionnaire - Barbara Soloman & Richard Felder
http://www.engr.ncsu.edu/learningstyles/ilsweb.html

Your Learning Styles (n ~ 52)



Active **Reflective**

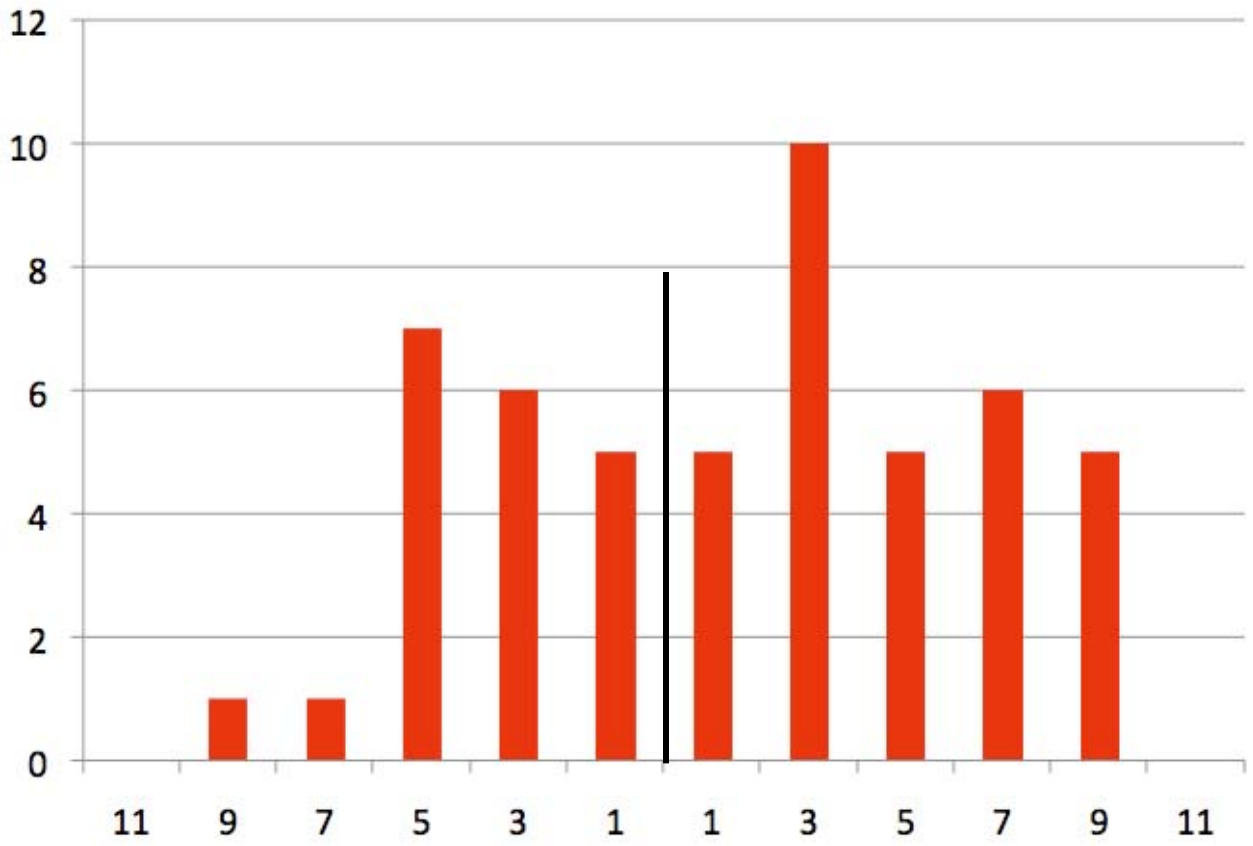
For comparison: Active 60%; Reflective 40%

Learning Styles

What type of information does the student preferentially perceive?

- **Sensory** – sights, sounds, physical sensations, data …
- **Intuitive** – memories, ideas, models, abstract …

Your Learning Styles



Sensing **Intuitive**

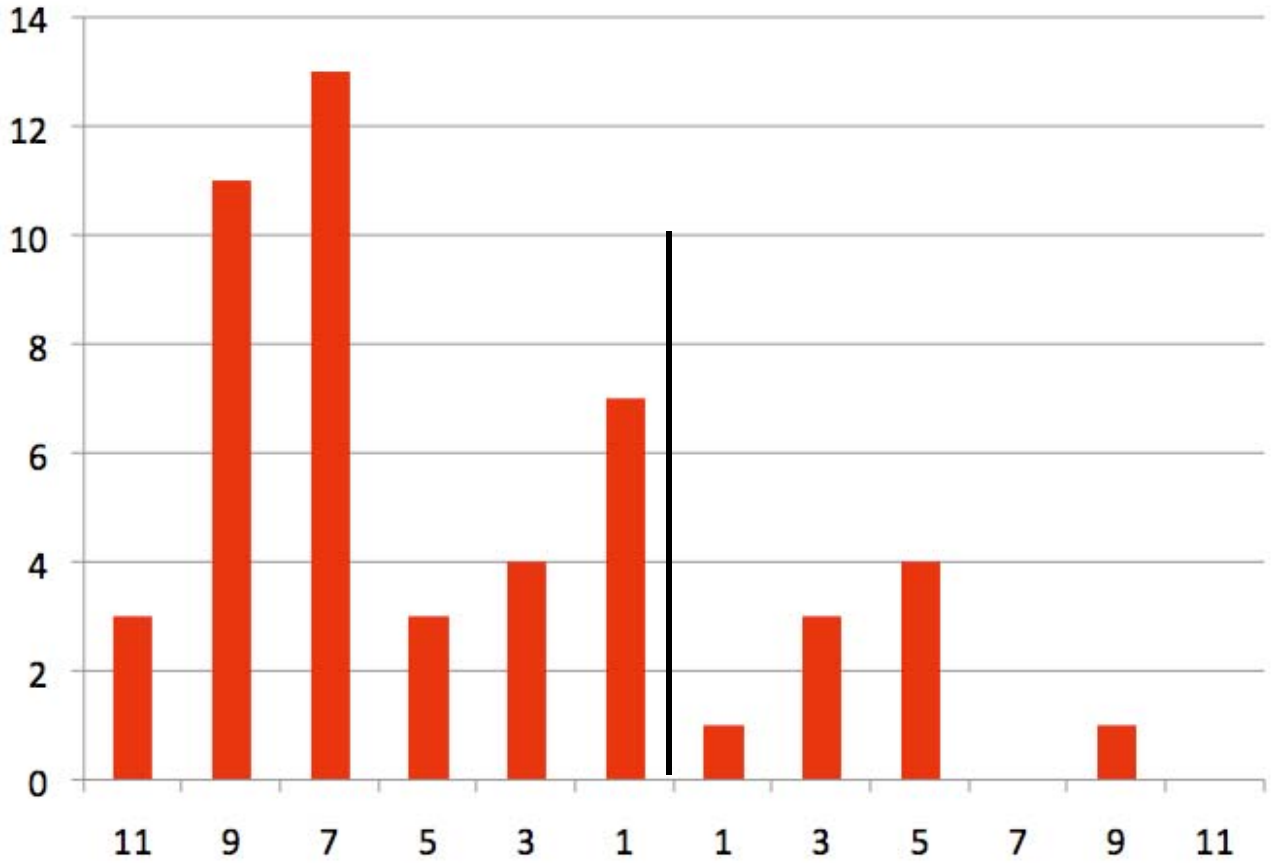
For comparison: Sensing 65%; Intuitive 35%

Learning Styles

How does the student most effectively perceive sensory information?

- **Visual** – pictures, diagrams, graphs, demonstrations, field trips
- **Verbal** – sounds, written and spoken words, formulas

Your Learning Styles



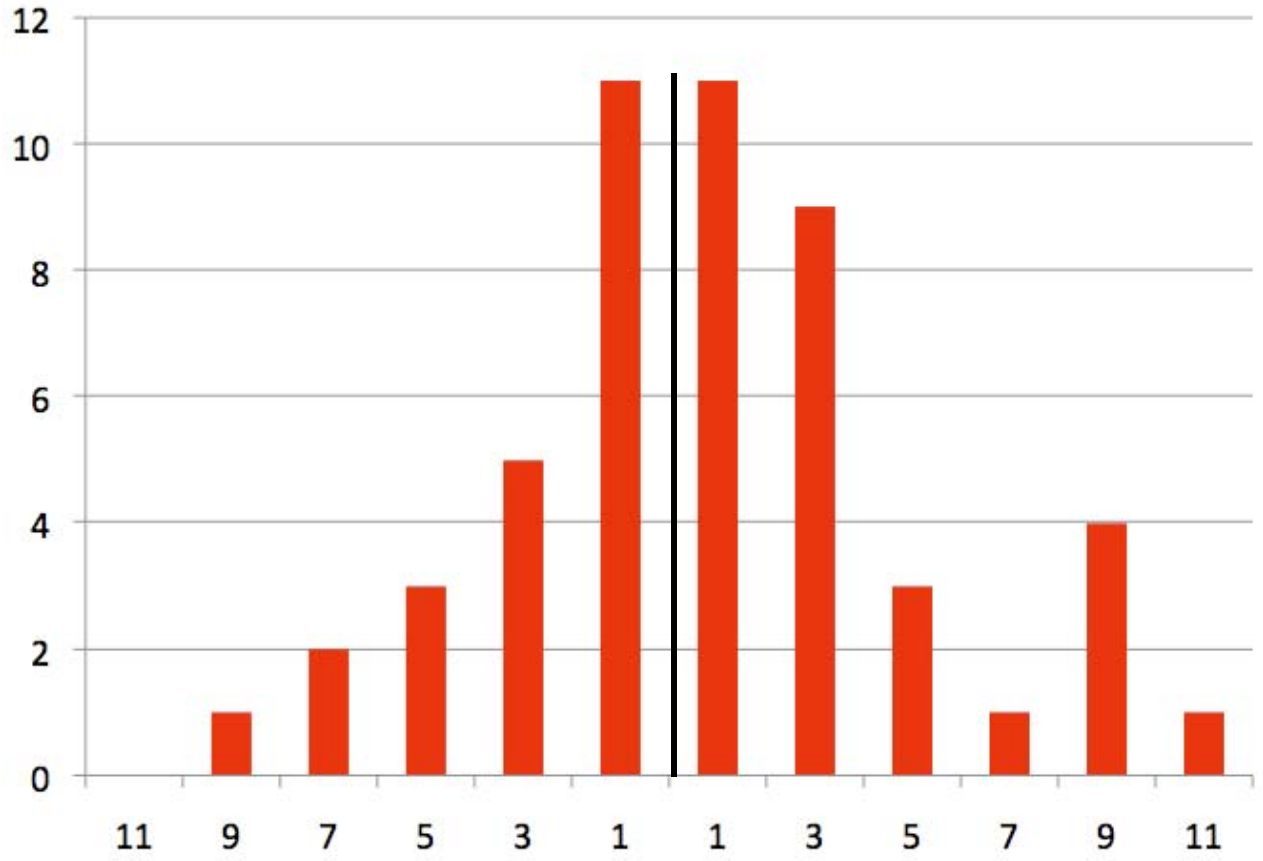
For comparison: Visual 80%; Verbal 20%

Learning Styles

How will the student progress toward understanding?

- **Sequentially** – in logical progression of small incremental steps
- **Globally** – in large jumps, holistically

Your Learning Styles

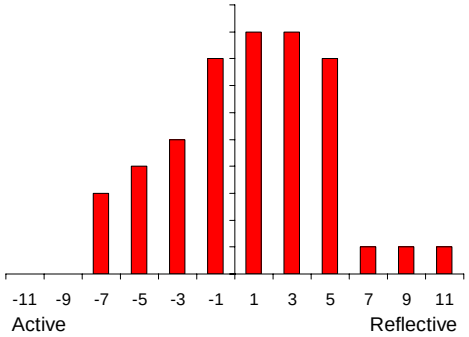


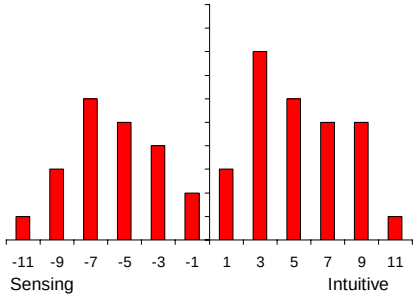
Sequential **Global**

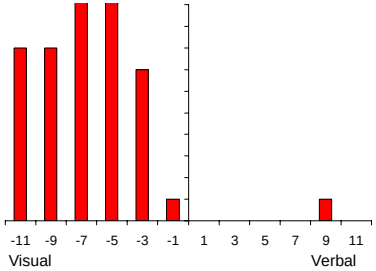
For comparison: Sequential 60%; Global 40%

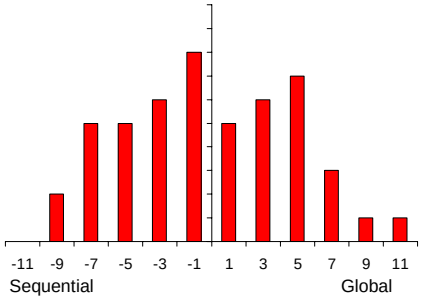
Learning Styles

- Different students will learn most effectively in different ways
- We can teach in ways that address a broad spectrum of learning styles





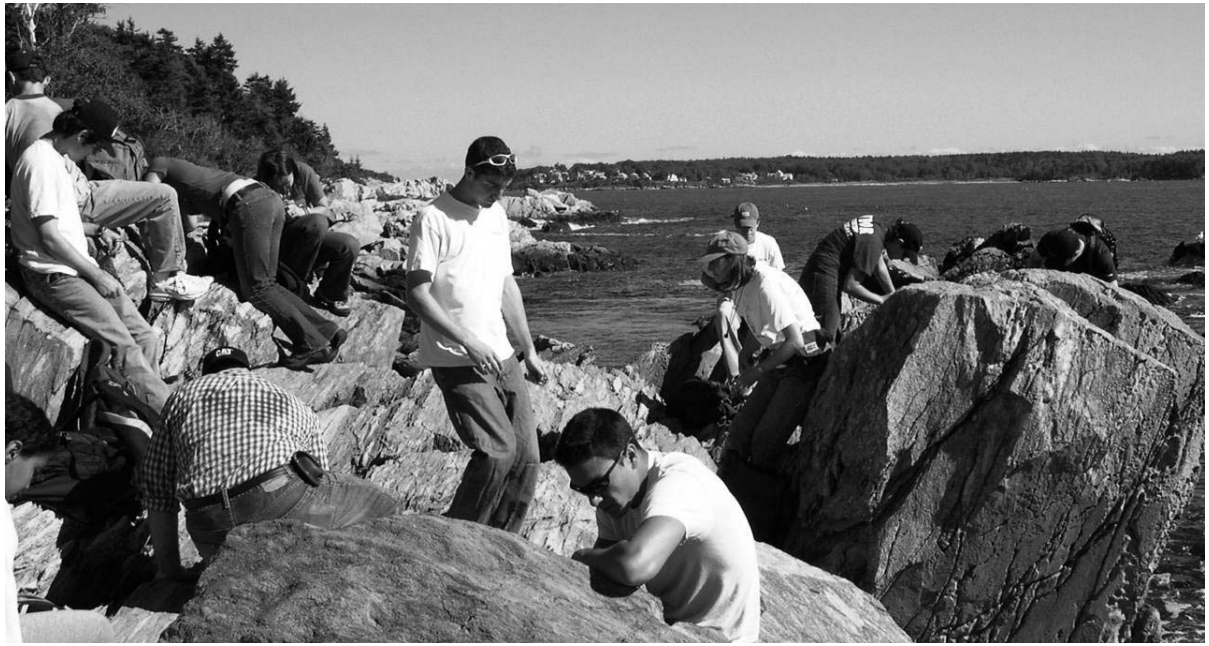




2007 workshop participants

Teaching Styles: Who are you?

- How do you like to teach? Why do you teach?
- How do you want to interact with your students?
- What do you find most satisfying when you teach?
- How flexible are you?



Designing a Course

- Consider **course context and audience**
- **Articulate course goals**
  - Overarching goals
  - Ancillary goals / general goals
    - Writing, oral communication, working in a team, quantitative, research, field, lab,
- Design **activities and assignments**
- Plan **assessment**

Overarching Goals

What do you want students to be able to do as a result of having taken your course?

- What do you do?
- What kinds of problems do you want students to be able to tackle?
- How might students apply what they have learned?
- How will they be different at the end of the course?

Some Examples of Goals

I want students to be able to:

- use characteristics of rocks and surficial features in an area to analyze the geologic history
- analyze unfamiliar areas and assess geologic hazards
- make a weather forecast given relevant meteorological data
- design computer models of earth processes

Evaluate overarching goals

- Does the goal focus on higher-order thinking (e.g. *derive, predict, analyze, design, interpret, synthesize, formulate, plan, correlate, evaluate, create, critique* and *adapt)*?
- Is the goal student-focused, rather than teacher-focused?
- Could you design an activity/assignment that would allow you to determine whether students have met the goal or not *(does the goal have measurable/observable outcomes)*?

Evaluate these goals

Consider the course that you will be teaching…

- ***What are your overarching goals?***
  - When students have completed my course, I want them to be able to:

Designing a Course

- Consider **course context and audience**
- Articulate **course goals**
- Design activities and assignments
  - ***What makes an assignment successful?***
- Plan **assessment**

Designing Activities

Consider whether an activity or assignment…

- has an effective "hook" that engages students?
- places new knowledge, tasks, and experiences into the context of what students already know?
- requires students to synthesize, discuss, extend, or reflect on what they have learned?
- meets the goals outlined by the instructor?
- has a means for the instructor to evaluate whether the student has met the stated goals?

Designing Activities

Often many ways to design an activity to meet a goal.

If I want students to be able to analyze map data, I might:

- Prepare a Gallery Walk of maps around the classroom
- Ask a series of directed questions about a map (in lecture or as homework)
- Have students prepare clay models of topo maps and share them with the class
- Ask students to complete an interpretative cross-section during lab
- Have students prepare a map of their hometown using GIS and identify possible hazards
- …

Designing a Course

- Consider **course context and audience**
- Articulate **course goals** objectives
- Design activities and assignments
- Plan **assessment**

How do <u>you</u> assess student learning?

Assessment

- **Formative Assessment**

  Can enhance learning by:

  - Determining what is understood
  - Providing feedback to student and professor
  - Allowing for intervention
- **Summative Assessment**
  - Evaluates what a student has attained at the end of an activity or course
  - Offers little opportunity for intervention

Assessment
In-Class Formative Strategies

- **Minute papers** – summarize a topic explored in class
- **Muddiest point** – What concept or idea is most unclear to you? What question do you have about it?
- **ConcepTest** – multiple-choice questions that provide immediate feedback on student understanding (can be used with electronic response system)

Assessment

Journals, portfolios, blogs

- Give tangible evidence of student accomplishments and understanding
- Allow students to reflect on their learning
- Provide opportunity to connect various components of course

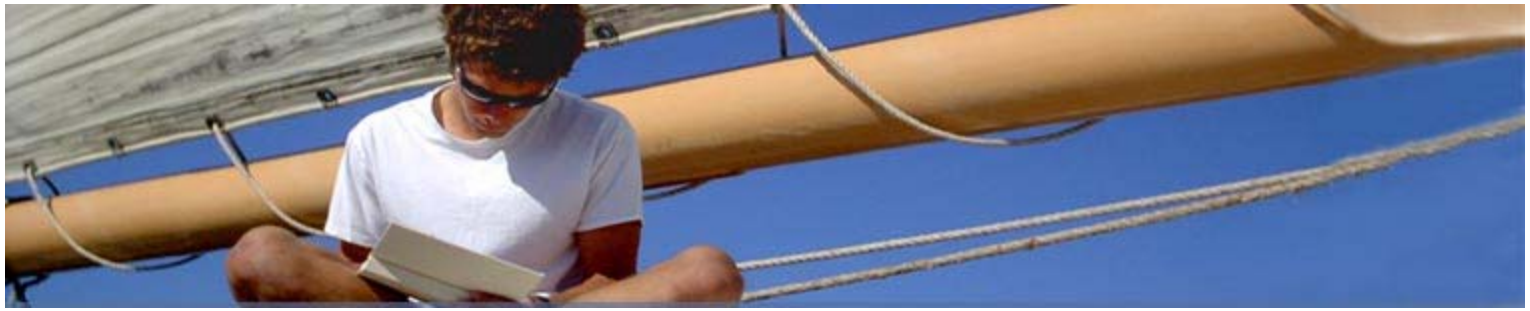


Photo from http://www.williams.edu/williamsmystic

Assessment

Rubrics

- Let students know what is important
- Provide clear criteria
- Improve consistency in assigning grades
- Can improve efficiency in grading

GEO 415: SCORING RUBRIC FOR WRITTEN QUESTIONS

grade	criteria
5	questions answered completely; logic of solution is clear; factual information is correct; all calculations are free of errors; conclusions are accurate
4	questions answered with some supporting documentation; logic of solution may have minor lapses; factual information is essentially correct, although not always clear; calculations may have minor errors; conclusions are essentially correct within a reasonable deviation
3	questions answered; logic of solution may have large uncertain components; some factual information is missing; calculations show some errors; conclusions deviate from the desired path
2	questions not answerd completely; logic of solution difficult to follow; factual information not always correct or shown; calculations have large errors; conclusions not always within the realm of reasonable deductions
1	questions are mostly not solved; logic of solution is unclear; information is missing or incorrect; calculations have large errors; conclusions are unreasonable.

Criteria Analysis

Logic _____
Information _____
Calculations _____
Conclusions _____

Comments:

http://rubistar.4teachers.org/index.php

Assessment: Exams

Two-stage Cooperative ("Pyramid") Exams

Goals:

- Encourage higher-order reasoning during exams
- Make exams a better learning experience
- Reinforce the value of collaboration

Stage 1: multiple choice or other type of exam

Stage 2: exam done a second time with collaboration (some additional questions)

Assessment: Many possibilities

http://serc.carleton.edu/NAGTWorkshops/assess/types.html

Assessment: Bloom's Taxonomy

Bloom's Taxonomy (original)	**Learning Skill**
Remembering (Knowledge)	Recognizing and recalling
Understanding (Comprehension)	Interpreting, classifying, summarizing, inferring, comparing, explaining
Applying (Application)	Executing and implementing
Analyzing (Analysis)	Differentiating, organizing, attributing
Evaluating (Synthesis)	Checking, critiquing, reorganizing, making judgments, synthesizing
Creating (Evaluation)	Generating, planning, producing, evaluating

Bloom's taxonomy of educational objectives (Bloom et al., 1956); Revised framework (Pohl, 2000); figure modified from Steer (2008) revised from King, 1995

Context for Today's Sessions

- Students have different learning styles
- Active engagement is important for learning
- Articulate learning goals when designing courses
- Design and adapt activities with review criteria in mind
- Expand your "toolbox" of teaching and assessment strategies

Most students
passive

most students
active