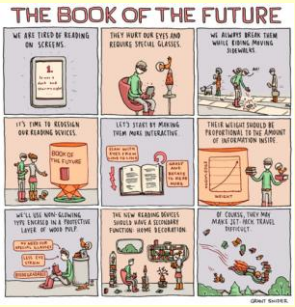


http://www.incidentalcomics.com/2012/04/book-of-future.html

Getting Ready for Class: A Fresh Look at Course design

Dr. David McConnell
Professor, Marine, Earth & Atmospheric Sciences
North Carolina State University

Session Learning Goals

After the workshop, participants will be able to . . .

- Write effective learning goals for different classroom scenarios
- Create examples of formative and/or summative assessments associated with their learning goals
- Describe one or more in-class activities that could be used to teach the concept addressed in the learning goal
- Use this template to design future lectures, labs

Student Comments About Teaching

I had a _____ professor who approached it from the level of the student and it was just the greatest course. A lot of them don't care of they don't know how a student learns. They just throw it on the board and expect everyone to be able to see it.

They just can't understand your questions. They don't understand why you don't understand, and they can't explain what they are telling you any other way. And they just look at you with this blank stare going, 'I don't understand what your problem is.'

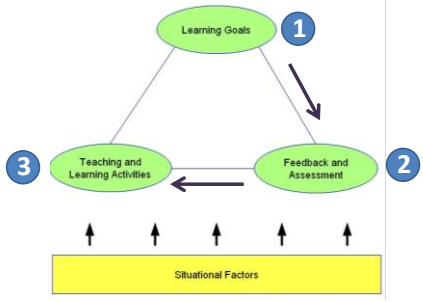
If everybody failed the test, then the teacher behaved as if no one was studying or knew their stuff. Why didn't he think that maybe the class was going too fast, or the test wasn't that good?

I even thought about changing my major because it just seemed like all memorization. You don't have to do any critical thinking. I think that professors should always ask questions that test your understanding, and not just your ability to memorize.

Seymour & Hewitt (1997)

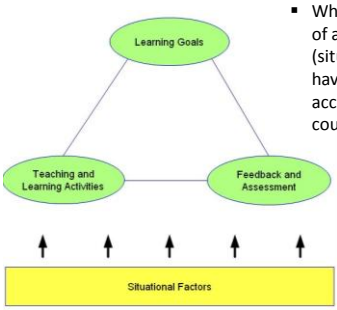
What do these comments suggest about teaching?

Backward Course Design



Fink, 2003

Course Design Components



- What are the challenges of a course or content (situational factors) that have to be taken into account when designing a course or lesson?

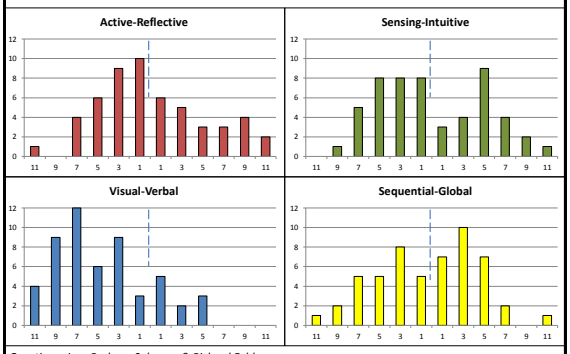
Examples:

- student learning styles

Fink, 2003

Learning Styles Inventory

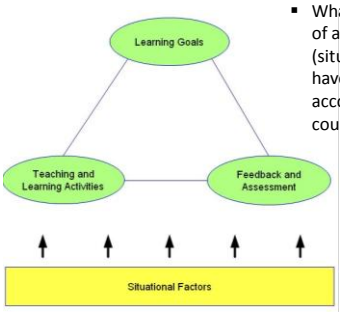
Preparing for an Academic Career Participants 2012



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

n = 53 for all graphs

Course Design Components

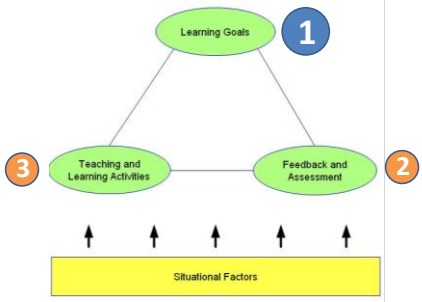


- What are the challenges of a course or content (situational factors) that have to be taken into account when designing a course or lesson?

Situational Factors:
- Class size
- Student motivation
- Content misconceptions
- Majors vs. non-majors
- Student ability
- Student academic rank
- Face-to-face vs. online
- Lecture vs. lab
- Physical space

Fink, 2003

Course Design Components



Fink, 2003

Teaching/Learning Goals

1. **Goals should focus on the work of the students, not the teacher.**
   - ***Teacher-focused goal:*** Provide students with information on the three major types of rocks.
   - ***Student-focused goal:*** Use data from rocks and minerals to create a simplified geologic history of their region.

Teaching/Learning Goals

2. **What will students learn and be able to do? (SWBAT)**
   - What will students have learned by the end of the lesson/chapter/course that they don't know now?
     - SWBAT list the periods of the geologic time scale.
     - SWBAT recognize erosional and depositional glacial landforms on a topographic map.
     - SWBAT explain how geologists use radioactive decay of elements to determine the ages of rock.
     - SWBAT interpret unfamiliar geologic maps and construct cross sections.
     - SWBAT interpret the depositional history of the sequence given an outcrop or stratigraphic section.

Teaching/Learning Goals

3. **Goals should clearly demonstrate student learning.**
   - Learning should be measurable. Instructor should identify an activity to evaluate student learning.
     - ***Yes*** → SWBAT interpret unfamiliar tectonic settings based on information on landforms, seismicity, and volcanic activity.
     - ***No*** → SWBAT understand plate tectonics.
   - When possible, include an action term (e.g., identify, apply, explain, analyze, sketch, summarize) that requires that students do something.

Teaching/Learning Goals

4. **For major goals, focus on higher order thinking skills and/or authentic tasks**
   - ***Yes*** → SWBAT evaluate an unfamiliar area for geologic hazards.
   - ***No*** → Students will know about geologic hazards.
   - Students will be able to design and carry out a project involving collection, analysis, and synthesis of data to solve a complex, open-ended problem.

http://serc.carleton.edu/NAGTWorkshops/coursedesign/tutorial/goals.html

(see later session on Bloom's Taxonomy)

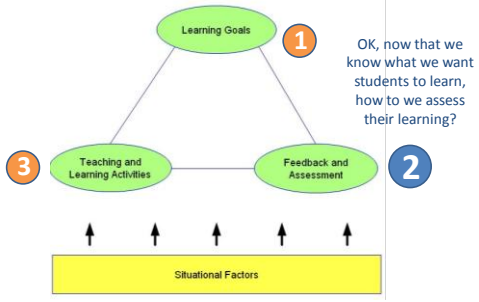
Teaching/Learning Goals

Write a sample Learning Goal

- SWBAT . . .

Assessment
- *Student-focused*
- *Higher order thinking skills?*
- *Is the goal clear?*
- *Demonstrates learning?*

Course Design Components



Fink, 2003

What Students Hear

The Montillation of Traxoline

Directions: Read the passage below and answer the questions that follow.

It is very important that you learn about traxoline. Traxoline is a new form of zionter. It is montilled in Ceristanna. The Ceristannians gristerlate large amounts of fevon and then brachter it to quasel traxoline. Traxoline may well be one of our most lukized snezlaus in the future because of our zionter lescelidge.

1. What is traxoline?
2. Where is traxoline montilled?
3. Why is it important to know about traxoline?

(attributed to Judy Lanier)

Feedback & Assessment

Assessment - activities that are undertaken to provide information to be used as feedback to modify teaching and learning practices

Formative assessment - evidence used to measure student learning to identify how well they are learning and to help the teacher to improve ongoing instruction

Summative assessment - the use of data, assembled at the end of particular sequence of activities, to provide an overview of learning

"When the cook tastes the soup, that's formative; when the guests taste the soup, that's summative."

Feedback & Assessment

More instructor understanding of learning

Learning assessment systems

Less instructor understanding of learning

- Few, small classes (lots of instruction time per class/student)
  - On-going assessment through student discussion, weekly writing etc.
- Moderate-sized classes
  - Instructor grading of short answer and essay questions
- Large classes or more classes (less time for instruction for each class/student)
  - Computer grading of multiple choice questions, few/no writing opportunities

Feedback & Assessment

Formative assessment (practice)

- Measures learning in no-stakes or low-stakes opportunities to help instructor adjust ongoing instruction to meet student needs
  - Small group discussion exercises (Think/Pair/Share)
  - Clicker questions (group vote/class meta-analysis)
  - Student worksheets, minute papers
- Provides opportunities for self-assessment
  - Retrieval exercises – pause and write down . . .

(see later session on student learning)

Feedback & Assessment

Summative assessment (the big game)

- Measures learning at end of learning unit, accounts for a modest to large proportion of student grade
  - Moodle quizzes
  - Homework assignments
  - Essays, reports, posters, etc.
  - Midterm exams

Feedback & Assessment

Assessment Criteria and Standards

- Clearly explain grading criteria and standards
- Identify traits of high/intermediate/low quality work for significant tasks
  - Remind students of learning goals
  - Consider sharing basic scoring rubrics with students prior to completion of work

Sample Analytic Rubric

Level of Achievement	General Presentation	Reasoning, Argumentation
Exemplary (10 pts)	1.Provides a clear and thorough introduction and background 2.Addresses the question 3.Presents arguments in a logical order 4.Uses acceptable style and grammar (no errors)	1.Demonstrates an accurate and complete understanding of the question 2.Uses several arguments and backs arguments with examples, data that support the conclusion
Quality (8 pts)	1.Combination of above traits, but less consistently represented (1-2 errors) 2.Same as above but less thorough, still accurate	1.Uses only one argument and example that supports conclusion
Adequate (6 pts)	1.Does not address the question explicitly, though does so tangentially 2.States a somewhat relevant argument 3.Presents some arguments in a logical order 4.Uses adequate style and grammar (more than 2 errors)	1.Demonstrates minimal understanding of question, still accurate 2.Uses a small subset of possible ideas for support of the argument.
Needs improvement (4 pts)	1.Does not address the question 2.States no relevant arguments 3.Is not clearly or logically organized 4.Fails to use acceptable style and grammar	1.Does not demonstrate understanding of the question, inaccurate 2.Does not provide evidence to support response to the question
No Answer (0 pts)		

Diane Ebert-Moy, MSU (http://www.floguide.org/cot/rubrics/rubrics1.php)

Feedback & Assessment

"FIDElity" Feedback

- **Frequent** – where 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 empathy when delivering feedback

Adapted from Fink, 2003

Learning Goals Assessment

How will you assess your learning goal?
(Formative/summative questions, rubric for good/fair/poor responses)

Student Comments About Teaching

You just get this feeling that the material was so much more important than the people who were supposed to be learning it – a sense that, 'It's much more important that I get this material out than that you take it in.' I might be making these _____ professors out to sound like big cocky bastards, but they didn't take a very active interest in whether the students learned or not.

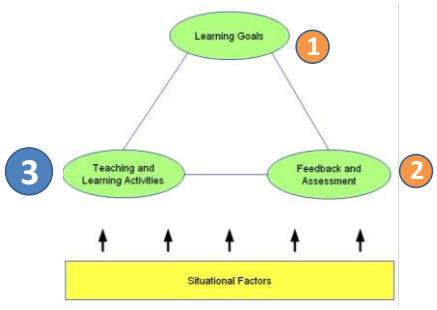
_____ was great. I loved it – got an A – but I worked harder than ever before. She motivated you, excited you, and demanded your very best. And I like that. In a class where someone is just doing a general coverage of something, it lulls me to sleep. I wonder whether this person is really teaching me, or is the book my best friend?

The professor is *by far and away*, I think, the main determining factor in how well you do in a class, and how much you learn. I could give several examples of courses I've taken with one professor, which my room-mate had taken with another. And you'd think they were teaching two different subjects. It's definitely the teacher thing.

Seymour & Hewitt (1997)

What do these comments suggest about teaching?

Course Design Components



Fink, 2003

Lecture – What is it good for?

Lecture is very effective for . . .

- Organizing and framing reading assignments
- Placing materials in context of the course
- Modeling the role of a content expert
- Demonstrating instructor enthusiasm for material
- Personal reflections of instructor

Lecture is less effective for . . .

- Enhancing critical thinking
- Providing feedback
- Promoting social/emotional development
- Appreciating diversity
- Building learning communities (reducing attrition)

What research tells us about student learning

1. *Students learn key concepts better when they have opportunities to actively monitor their understanding.*
2. *Students become better learners when we challenge them to answer questions that require the use of higher order thinking skills.*
3. *Knowledge is socially constructed and people learn best in supportive social settings.*

Teaching as Doing

A Learner-centered Class

- Lecture broken into short segments, separated by assessments
- Students work together in groups
- Formative exercises during class used to assess student understanding and progress toward learning goals

McConnell, D.A., Steer, D.N., & Owens, K., 2003, Journal of Geoscience Education, v. 51, #2, p. 174-183.

The Value of Peer Collaboration

Experimental Group: Three 2-minute pauses per lecture, student discussion of lecture content with peer.
Control Group: No pauses for discussion in lecture.

Students completed a delayed multiple choice test 12 days later

- Experimental Group – average test score : **84.39***
- Control Group – average test score : **76.28**

Ruhl, Hughes, and Schloss., 1987. Teacher Education and Special Education, v.10 #1, p.14-18

Examples of Teaching/Learning Activities

Small group discussion
Think/pair/share
} Best w/open-ended questions (more than one "right" answer)

Peer instruction (w/clickers) — Conceptual MC questions

Role playing — Real-world (authentic) scenarios

Jigsaw exercises
Data/image interpretation
} Opportunity for individual student – small group – whole class discussions

Others?

Summary

- Identify clear learning objectives
- Create tasks (assessments) associated with learning objectives.
- Provide students opportunity to practice tasks or task components during class (formative assessment, active learning).
- Match measurable summative assessments to learning goals as directly as possible.