Implementing Course Design

or

“Now what?”

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Now What?

ADE

• Ready?
  – ASSESS

• Set?
  – DETERMINE GOALS
    – Administrative requirements
    – Departmental requirements
    – Available resources
  – Go!
    – IMPPLEMENT
    – Evaluate
• (and repeat)

Background

• Course re-design
• Lab for year-long intro course
  – Most students are NOT geology majors
  – Lab required
  – Fulfills gen-ed requirement
• Originally:
  – Met once per week, 2.5-hour session
  – 15 students per lab
  – Labs in Fall semester only
  – Taught by graduate students

Ready?

Assess Current Labs

• Written student evaluations after each lab
  – Anonymous
  – Students were asked
    • To evaluate
      – Lab exercise
      – TA
    • What they think they learned
• Oral debriefings with TAs after each lab

1998  1999

• Identification of “Bad Labs”

Ready?

• Each semester, identified worst 3 labs
• Determined if they could be fixed or not
  – What skill is that lab trying to teach?
  – Can the same skill be taught in a different way?
• Trashed hopeless labs

1998  1999

Ready?

Assess the assessment

• End of semester evaluation as well
• What labs worked? Why?
• What labs didn’t work? Why?
• What labs could’ve worked with different teaching methods?

1998  1999

Arrival at UB  Evaluations
**Logistical Requirements**

- **Administrative**
  - Increase enrollment
  - Decrease handouts (create lab manual)
- **Space**
  - One small classroom with no sink, no running water, no computer
  - Can’t go outside after mid-October
- **Time**
  - Decrease lab to 2 hours
  - No lab the first week of class

**Scholarly Requirements**

- What do the upper-level instructors want majors to know?
- Surveyed instructors via email
- Ranked requirements by frequency and importance

**Minerals and rocks:**

- Quartz
- Calcite
- Other rocks, rock-forming minerals not as important

- Collect data and graph it
- Interpret graphed data
- Read a map

**My Requirements and Goals**

- **Fun**
- **Active**
- **Local**

- Make it connect with what they’re learning in lecture
- Make it worthwhile: this is the ONLY science course most of the students will get

**My Goals: The 3 A’s**

- Awareness
- Appreciation
- Action

**Nuts and Bolts: What we did**

- Went to full year of labs
  - Second semester optional; required for majors
  - Designed & implemented 6 new labs in one year
  - Found out which ones needed help
  - Improved them
  - Ran ’em again the following year
More Nuts and Bolts

• Ran same labs year 2
• Terminated some labs after year 2
• Returned to one-semester schedule in year 3
• In year 4, had to go back to same # of labs but now stretched over the whole year…

Examples of “New & Improved” Intro Labs

• Rock & mineral ID
  – Trip to campus cemetery
  – Student-based classification schemes
• Fossils
  – Dinosaur footprints & calculating dino speed
• Map reading
  – Selecting the next Mars landing site
  – Creating a lunar geologic map

Mars Landing Site Selection

• Skills:
  – Map reading
  – Scientific consensus
• Technique: Jigsaw
  – Students are assigned to be one of:
    • Astrobiologist
    • Engineer
    • Geologist
  – Determine top 3 landing sites given constraints

Channels on Mars: Astrobiology

Mars Topography

Mars Rock Abundances
Extraterrestrial Volcanism

Mars Global Geology

Mars Composition

Examples of “New & Improved” Intro Labs

- Rivers
  - Stream table
  - Geologic hazards
- Geologic dating
  - Made competitive
  - Used radiometric dating to explore geometric relations, graphing
- Impact cratering

Impact Cratering

- Skills:
  - Observations
  - Mathematics
  - Making & testing hypotheses
- Technique:
  - Hands-on
  - Slingshot marbles into trays of sand
  - Pumpkins from the top of our 9-story building

Lessons Learned: Did Right

- Same lead TA for 3 years running while major revisions underway
- Weekly meetings with all TAs before and after
- All first-time labs taught by professor
- Patience is a virtue…
Lessons Learned: Goofs

- Labs that take 2 weeks (Mars OK)
- Labs with “too many” rocks or minerals
- Labs with “too much” reading before or during
- A bad TA can ruin everything

Big Losers

- Acadian Orogeny
- Taconic Orogeny
  - Too much reading
  - Too many rocks that weren’t “real”
  - Students smelled fraud, fear and disorganization

Continuing Process

- Still have students evaluate every semester
- Ask faculty every year what they want their students to know
- Meet with TAs at least weekly
- Add supplies gradually as department can afford them

Course (re)Design Implementation: Conclusions

- Keep an open mind
- Be aware of your:
  - Requirements (at all levels)
  - Limitations (temporal, spatial, financial, intellectual…)
  - Goals
- LISTEN!
  - To the students
  - To the TAs
  - To the other faculty

Course (re)Design Implementation: Conclusions

- Ready?
  - Assess current status
- Set?
  - Determine requirements, limitations, goals
- Go!
  - Try new things
  - CONSTANT evaluation

ADE

- Assess
- Determine
- Evaluate

“Success is the ability to go from one failure to another with no loss of enthusiasm.”-- Churchill

(Rinse, lather, repeat)