Doing Inquiry at a distance

Sawing like a Swede
Dancing backwards
Sending Jam by email
Overview

• Sawing like a Swede
  o Translating f to f to DL
    • What is different?
    • What stays the same?

• Dancing Backwards
  o Backwards design, starting with outcomes
    • Olbers’ paradox example
    • Known Universe follow up
    • Speed of light in a microwave example
    • Reflecting on what went wrong (and what worked)

• Sending jam by email
Example of sawing a plank using a two-person saw

Chester County, PA Up and down Sawmill moved to Smithsonian
Another Approach

http://www.sawmilltrader.com/viewad.asp?id=50280403658100080
Where are the faces?

• How do I teach them when I can’t see them?
• How can I know what they get and what they don’t?
• How will they test ideas when they don’t know classmates?
• How can they do collaborative work?
Where is the teacher?

- I need someone to teach me.
- I can’t do it by myself.
- What time is the lecture?
- Do we have to come to the lectures?
- Can you post the power points?
- It isn’t clear.
- There is too much work.
Where is the stuff?

Labs – hands on – everything needed is there
Lectures – demos and group activities
Active learning?
Investigations?
Feed-back on work?
A few tools for large lectures

Readings
Lecture
Demos
Small group activities
Small group discussion
Clickers
Student questions in class
Tests and quizzes
Body language

Readings
Videos of lectures
Other videos
Narrated slides
At-home assignments
Discussions
Group assignments
Synchronous sessions
Auto-graded homework
Email exchanges
Tests and quizzes
Formative questions
Introductions with photos
Thinking differently – Consider the saw!

- What tools do you use in face to face classes?
- Which of these translate directly to distance learning?
- Which ones are “two-person” saws?
- What technologies might turn those into circular saws... or better!
- What is lost – What is gained?
Dancing Backwards

Backwards design and planning with the end in mind
Why?

• Why do we want to teach them science?
• What 3 or 4 outcomes are most important?
• What will they do to learn in those areas?
• What assignments, activities, readings and projects can I design to get at these outcomes?

• How can I do any of this online?
Objectives and outcomes

- General education natural science courses:
  - engage students in scientific exploration
  - foster their curiosity
  - enhance their enthusiasm for science
  - enable them to apply scientific knowledge and reasoning to personal, professional and public decision-making
Learning Goal

• Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding:
  o evolves based on new evidence
  o differs from personal and cultural beliefs
Olbers’ Paradox At-Home Assignment

1. Count the stars in your neighborhood
2. Watch video exploring the paradox and resolution
3. Explain paradox and discuss possible solutions
   - Not infinite
   - Not static
   - Not eternal
4. How does Big Bang theory relate?
Olbers’ Paradox
Known Universe discussion
Discussion assignment

Watch The video "The Known Universe." Prepare "a teachable moment."

For example: At time 1:15 on the video a number of green lines are shown circling the Earth. What do you think those green lines represent?

In addition to finding a "teachable moment", comment on at least one other posting.
Speed of light in a microwave assignment

Cover plate with chocolate chips

Remove turntable and cook until chips melt in spots
Electronic s’mores?

Frustrations
- Math
- Metric units
- Finding oven frequency
- Turntable setup
- 2 or 3 took values from an internet site

Rewards
- Asked “why” questions
- Decided what to report
- Worked with others
- Calculated a fundamental constant
- Repeated voluntarily after failure
- Ate the results
Sending Jam by email

• How do you capture human warmth and connection?
Your turn

• List a couple of learning goals for your course

• What things do you already do to support one of the goals?

• What can students do at home that will support the goal?

• What difficulties do you anticipate?

• What rewards for you and students do you anticipate?
References

Used in presentation:

• The Known Universe produced by American Museum of Natural History and originally found on Astronomy Picture of the Day at http://apod.nasa.gov/apod/ap100120.html

• Olbers’ Paradox – A Level Physics video found on U-Tube at http://www.youtube.com/watch?v=yQz0VgMNGPQ


Backwards Design references:
