Teaching the Difficult: Decoding the Disciplines

This presentation is based on the work of Indiana University Freshman Learning Project and the History Learning Project (HLP) with Arlene Diaz, David Pace, and Leah Shopkow. The HLP has been funded by the Teagle and Spencer Foundations, and the Indiana University Office of the Vice-Provost for Undergraduate Affairs, College of Arts and Sciences, and History Department.

Joan Middendorf
Content + 10,000 Methods
I. Theories of Difficulty

1. Compound Interest
2. Building a financial vocabulary
3. Budget, Savings, & Debt
4. Anatomy of a Paycheck
5. Saving Prioritizations
6. Investment Horizons
7. Risk Adversity
8. Risk/Return Trade-off
9. Investment Vehicles
10. Retirement Projection
11. Balancing Liquidity and Risk with Savings Goals
12. Retirement Plans, Portfolio Diversification, and Inflation
Theories of Difficulty

Compound Interest
Building a financial vocabulary

Budget, Savings, & Debt
Anatomy of a Paycheck

Saving Prioritizations
Investment Horizons

Risk Adversity

Risk/Return Trade-off
Investment Vehicles

Retirement Projection
Balancing Liquidity and Risk with Savings Goals

Retirement Plans, Portfolio Diversification, and Inflation
Step 1: Where are there bottlenecks to learning?

The “Decoding the Disciplines” Cycle

1. What is a bottleneck to learning in this class, a place where many students consistently fail to master crucial material?
2. What do specialists do so they get past this bottleneck?
3. How can I explicitly model these operations for students?
4. How can I give my students an opportunity to practice and get feedback on each of these operations?
5. How can I motivate students and address the affective side of learning?
6. How can I tell whether students have mastered these operations by the end of the process?
7. How can I share what I have learned with others?
A Bottleneck in History:

Nature of Discipline film here:
Step 1 Bottleneck in History

- Students do not understand the nature of the discipline--that it is about interpretation, not memorization of events and dates
Other Examples of Bottlenecks. Students find difficult:

- Art History:
  - Identifying the artistic structure and style underneath the content of an art work

- Computer Science
  - Recognizing the applicability of a mathematical proof to writing a computer program

- Anthropology
  - Seeing oneself as having a culture

- Geology
  - Distinguishing the processes that are relevant at different time scales
Step 2: Decoding

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### 2009 Geologic Time Scale

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*International ages have not been fully established. These are current names as reported by the International Commission on Stratigraphy.*


A Bottleneck in Geology:

Timescale video here
Decoding the Disciplines: Learning is difficult because…

- In every discipline there are unique ways of operating.
- Faculty create knowledge, but they do so in a tacit manner.
- Many teachers in the classroom simply transmit the results of knowledge creation.
- Faculty who transmit knowledge may believe they are opening the threshold of knowledge to students.
- From the student perspective, the threshold may be blocked.
Decoding the Disciplines

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Step 1: The Bottleneck

What is a bottleneck for the students you teach in one of your courses?

- **Think and write (2 minutes)**
- First member of group speaks (3 mins)
- Second member of group speaks (3 mins)
- Third member of group speaks (3 mins)

See Handout 2
Step 1: The Bottleneck

- What did you learn about each others’ bottlenecks? Were there similarities or differences?
Step 2: Defining What an Expert Does

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Step 2: Decoding Tacit Knowledge

What kind of thinking does it take to get past the bottleneck?
--Unpack disciplinary unconsciousness to uncover the underlying cognitive process
A Bottleneck/Threshold Concept from Geology: First the chart, and then Michael movie.
Step 2: Novices Interview Expert

1. Ask the expert: “What do YOU do?”
2. Imagine yourself doing what they describe. Then summarize what you understood needs to be done. Are crucial steps being left out?“
3. Probe at the place the expert cannot explain.
4. Reassure the expert.
5. A strength of the novice is being able to share their lack of understanding.
6. Gently interrupt if interviewee talks about how they teach their students or if they start to lecture.
Step 2 Bottleneck Interviews

- Listen for the questions
Step 2: The Interview

Interview (15 minutes)

Choose one of your group to be interviewed; the others will be interviewers

The interviewers will interview the expert about his or her bottleneck problem. Both interviewers may ask questions.

Try not to let the interviewee
- lecture about their content.
- talk about how they teach their students.
Step 2: The Interviews

Summary
What did you learn from your interviews?
“We are calling for epistemology to be moved from the periphery of teaching and learning within the discipline to the core.”

-- History Learning Project

Shopkow, Diaz, Middendorf, Pace 2013
Two Theories of Difficulty

Bottlenecks (Emotional and Cognitive)

“I can’t do math”

Threshold Concepts

Elasticity of demand