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SoTL and the Creative Power of Faculty Learning Communities

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SOTL Commons – March 8, 2012

- SoTL and the Creative Power of Faculty Learning Communities

- Rider University Panel
  - Arlene Wilner, English and Baccalaureate Honors
  - Danielle Jacobs, Chemistry
  - Phillip Lowrey, Biology
  - Sharon Mirchandani, Music History and Theory
  - Bryan Spiegelberg, Chemistry/Biochemistry
Questionnaire

1. What approach do you take when planning your courses? What problems do you try to address and how?

2. Whom do you work with at your institution in this process? Do faculty teach and learn from each other, or do they view each other as “interference”?

3. How do your courses relate to your university strategic plan? Do they involve “connected learning”?
BRIDGE =

Bridging Research, Instruction, and Discipline-Grounded Epistemologies

- Begun in 2001, based on the CASTL model
- Has engaged >25% of full-time undergraduate faculty from 22 departments
- Results in a posted project summary for each participant
  - (92% completion rate)
- Has led to published research
- Selected projects are shared at campus forums
BRIDGE Readings of particular influence:

- “Making Assignments Worth Grading” (backward design) by Barbara Walvoord
- “On the Persistence of Unicorns: The Trade-Off between Content and Critical Thinking Revisited” by Craig E. Nelson

Bloom’s Taxonomy of Educational Objectives:
- Knowledge, Understanding, Application, Analysis, Synthesis, Evaluation
“It’s the hardest course you’ll ever take!”

- Organic Chemistry (CHE 211 & 214)
  - Major requirement for all Chemistry, Biochemistry, and Biology majors
  - Requirement for entrance into all medical, dental, and veterinary programs
BRIDGE Goals: Overcoming the Reputation

- Improve course accessibility & feasibility
- Improve course relevance
- Improve student metacognition & critical thinking
- Improve student awareness of course goals & personal capabilities
Strategy 1: Self-Assessment of Study Habits

- **Problem**: Students *memorize* rather than *learn* and *apply* basic chemical principles

- **Strategy**: Productive Study Time Logs (CAT #37)
  - Make students cognizant of their own habits
  - Successful and unproductive strategies
  - Proven alternatives for productive studying
(2) Take note of your method of studying. For example, you read the book while highlighting, or you read the Resonance Worksheet Answer Key, or you completed the Resonance Worksheet and then looked at the answer key. circle Exam I Feedback form for more examples.

(3) Take note of the following conditions:

- **Place:** where you studied – your dorm room, the library, your boyfriend’s house…
- **People:** who you studied with – yourself, with Paul the tutor, with Jane & Tom…
- **Distractions:** – the TV was on, you were on the phone, “reading” between naps…

(4) Rate the productivity of each half-hour segment that you studied, using the following scale:

1 = Unproductive: “Well, that was worthless!”
2 = Kinda Productive: “Ughh, it took me 3 hours to just get this? Isn’t there any better way of doing this?”
3 = Productive: “Ah, I’m getting it. Just a little more practice and I’ll be good!”
4 = Very Productive: “Damn that is easy now! I am ready for anything you want to throw at me, Dr. J!”

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Please give concise, specific answers to the following questions:

(2) Did you find any correlation between the study method and the productivity? Was this surprising or interesting?

(3) Did you find any correlation between the conditions and the productivity? Was this surprising or interesting?

(4) Did you find any correlation between the time of day and the productivity? Was this surprising or interesting?

(5) After reviewing this time log, do you have any ideas on what could make your studying more productive? That is, how might you study differently in the future?
Strategy 1: Self-Assessment of Study Habits

Results

- Fall 2010 Exam #1: 47.9% average
- Fall 2010 Exam #2: 65.5% average

Notable comments on productivity:

- If it was too noisy it was bad to focus. Also, my focus depended on the day. This was expected but it’s interesting that noise like music helps, but people don’t.
- I seem to study better at night. I hate mornings, so the night studying makes sense.
- I know that I need to figure things out on my own in a quiet environment and then seek help from others if I cannot do it on my own.
- Most important thing I learned was that a lot of time was used not as productive as I first thought.
- Practice problems and reviewing notes simultaneously was more productive than just reviewing notes alone. E-book helped with specific problems.
- Quiet + food + maybe music = enjoyable and productive! Lots of people around who aren’t doing chem. = BAD!
Strategy 2: Encourage Student Reflections

- **Problem**: Students scribble notes & wait to be *told* rather than *personally reflecting* on material and *determining* how it applies to course goals

- **Strategy**: Muddiest Point (CAT #7)
  - “Study Guides” list overall objectives, skills, & book questions associated with each skill for each section

- At end of each class, students personally reflect on the main points covered in that day’s class

Section 5: Structure, Properties, & Synthesis of Aldehydes & Ketones (Ch 13 & 20)
Theme: Biological Oxidation in the Citric Acid Cycle

Objectives
1. Understand the innate reactivity of carbonyl compounds
2. Recognize and understand the myriad ways to synthesize simple ketones and aldehydes
3. Appreciate the importance of ketones and aldehydes in carbohydrate, sugars, and steroids

Skills
☐ ________ Rationally and thoughtfully synthesize complex aromatic target molecules from benzene as a starting material (SB 19.5 & 19.6)
#23.81

☐ ________ Rationally and thoughtfully use retro synthesis to construct complex compounds using various nucleophilic substitution, elimination, and decarboxylation strategies (SB 23.8 & 23.9)
#23.51, 23.56, 23.89

☐ ________ Recognize, draw, and name acyclic and cyclic aldehydes and ketones according to IUPAC rules (SB 20.1)
#20.1-20.4, 20.44, 20.45, 20.49

☐ ________ Easily recognize amides, carboxylic acids, esters, acid anhydrides, and acid chlorides

☐ ________ Assess the structures of various carbonyl derivatives and rank their physical properties

☐ ________ Assess the structures of various carbonyl derivatives and rank their reactivity

☐ ________ Quickly recognize reaction conditions and predict the products of the metallic oxidation of alcohols (SB 13.7)
#13.12, 13.13

☐ ________ Draw complete electron-pushing arrow mechanism for the metallic oxidation of alcohols to ketones or aldehydes

☐ ________ Quickly recognize reaction conditions and predict the products of ketone- and aldehyde-forming reaction that are non-metallic oxidations
#20.5

☐ ________ Draw complete electron-pushing arrow mechanisms for ketone- and aldehyde-forming reactions that are non-metallic oxidations
Strategy 2: Encourage Student Reflections

- **Student Evaluation Results (1 best → 5 worst)**
  - *How useful were the section study guides in better organizing your notes, and making you well aware of the key concepts and skills required for exams?* \ Fall 2010 = 2.1; Spring 2011 = 1.7
  - *Were the tests reasonable and indicative of material covered in class and on homework assignments?*

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- *How would you rate the material contained in this course in terms of relevance?* (1)
- *Was the instructor able to communicate the subject’s relevance?* (2)

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To See the Forest AND the Trees

The Problem:
- Why do many students in BIO-117 (Introductory Cell and Molecular Biology) have difficulty making connections from one topic to the next?

The Goal:
- To help students recognize:
  - all of the topics covered are important in understanding the normal functioning of cells
  - they will need to retain this information for their future upper-level courses.
Experts notice features and meaningful patterns of information that are not noticed by novices.

Find ways to reorganize the course to emphasize meaningful connections among topics.

Experts' knowledge cannot be reduced to sets of isolated facts or propositions but, instead, reflects contexts of applicability: that is, the knowledge is "conditionalized" on a set of circumstances.

Find ways to encourage students to apply the new concepts they learn in class (e.g., through lab exercises).

Though experts know their disciplines thoroughly, this does not guarantee that they are able to teach others.

Promote peer-based mentoring/tutoring as another resource for students needing additional help in the course.

BRIDGE Strategy for BIO-117

- Introduction of Weekly Study Sheets.

- Perform frequent assessments of learning
  - (six 20-min quizzes, a mid-term exam, and a final exam)

- New test question format: the Short Answer Integration and Summary Question (SAISQ).

- Reorganization of the lab component to reinforce lecture

- Peer-based supplemental instruction with the Student Success Center

- Collaborate with colleagues in other science departments, to emphasize common themes across introductory courses.
As of the second year, approximately 80% (36 out of 45) of students pass with a C or better.

A Genetics colleague reports that students are better prepared

Question: If you believe you DID NOT do well in this course, what would have improved your performance?

◦ “I should have reviewed my notes before class and studied the lecture slides. I should have done problems and read the book more often.”
◦ “I could have spent more time with the material and not wait until the last minute to study.”
◦ “Organized myself better.”
◦ “Studying more.”
◦ “Using the book more and attending more SI sessions.”
Revision of:

- *Music in the United States* to: *American Music, American Identity*

Goals:
- Make material more meaningful by focusing on “big ideas”
- Improve critical thinking skills
- Improve research, writing, and presentation skills
Grading

Old Course

1) Research Paper
   Proposal 5%
   Rough Draft 5%
   Final Version 30%

2) In-class Performance 10%

3) Five tests 50%

New Course

1) Research Paper
   Draft 10%
   PeerMark 10%
   Final Version 30%

2) In-class 30-minute Presentation 10%

3) Five Assignments 25%
   Class Discussion 15%
Six Themes ("Big Ideas")

1. Melting Pot or Multicultural Salad?
2. Chaos and Order in Am. music and culture
3. Rel. btwn sacred and secular music
4. Music as a mirror of American society
5. Music as mediator of racial tension
6. Is there an American sound? How does it relate to American identity?
Some conclusions:

- Increased student interest
- More in-depth and meaningful presentations
- Better development of skills
- Freedom and relief from “coverage”
- Final papers were of higher quality

Where is the American in *An American in Paris*?
Getting Under the Covers with America: An Exploration of the Construction of American Musical Identity Through Cover Songs

*Rhapsody in Blue*: Gershwin’s Jazz concerto or Jazzy Concerto

The Use of Satire in American Music

E. Power Biggs, Virgil Fox, and the Organ in America
Averting the Content/Critical Thinking Tradeoff in Freshman Chemistry

- “Principles of Chemistry”
  - For Freshman science majors

- The BRIDGE experience *forced me to critically analyze* my approach:
  - Is this early course creating ‘dualistic’ thinkers?
    - “Just the facts, ma’am,” (Nelson channeling Friday)

- BRIDGE project: How can I help Freshman chemists become *scientific* thinkers?

What’s the problem?

- “Truth as simple and eternal”
  - “On the persistence of unicorns...”

  - Textbooks and “sages on stages” are correct and always have been

  - But: scientific thought approaches neither simplicity nor eternity!

One thing I have learned in a long life: that all our science, measured against reality, is primitive and childlike and yet it is the most precious thing we have. –Einstein (?)
The human struggle of textbook “authors” can instill ‘scientific thought’

- What was the foundation of great ideas?
  - What problem(s) led to the discovery? Scientific knowledge is not eternal!

- How did the scientific community work to solve the problem?
  - What inspired the great ideas? Did great thinkers work alone? Scientific knowledge is not simple!

- What were the implications of the solution?

- How has the model changed over time?
  - Scientific knowledge is not eternal!
Example: What happens to salt when it dissolves?
- Observation: salt water conducts electricity
- Textbooks in late 1800s
  - Electricity changes the salt “molecules”
- Theory/experiment of Svante Arrhenius:
  - Salt breaks apart into charge-carrying “ions”
- Ph.D. thesis
  - Ridiculed in 1884
  - Won Nobel Prize in 1903 (for his “electrolytic theory of dissociation”)
- Implications?
Building Campus Communities

BRIDGE has informed:

- Capstone assessment for Middle States
- A new project to support Faculty who Frequently Teach Freshmen
- Task Force work on revision of General Education
- Revision of Eng. Dept. syllabi for Composition
- Collaboration between LAS and CBA
- Appreciation for the value of SoTL as a credential for promotion