Teaching the Teachers: A Course in Chemistry for Chemistry Education Majors and New Teachers

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Overview

• The Course: *The Chemistry Curriculum and the Teaching Laboratory*
  - The Origins: Where the course came from
  - What it is: The course structure
  - What we do: The course activities
The Origins

• Need to address specific chemical concerns
• The Perfect Storm
  - System-wide graduation requirements
• Sabbatical experience in high schools

The Origins: ACS Guidelines

• Programs should include...
  - laboratory experimental design and preparation
  - stockroom procedures
  - safety
  - disposal of chemical waste
  - teaching assistant experience
  - the literature of chemical education
What it is... *The Course*

- 3 credit hours – undergrad or grad
- 2 hours “lecture”, 3 hours lab per week
  - *workshop format*
- Offered odd years
- Complements *Teaching of Secondary Science* methods course

What it is... *The Clientele*

- Junior & Senior BSEd Chemistry majors
- Graduate students
  - (MS in Curriculum & Instruction) - elective
- Current teachers – continuing education
- The mix is valuable
  - content is student driven in part
  - many points of view
What we do...

• First Charge to students
  - Concerning anything we do...
    • What do you think is good?
    • What do you think is bad?
    • What would you change and how?

What we do... Chemistry Topics

• Discuss and practice teaching certain topics
  - Revisit general chem and high school topics
• High school textbook review
• Class presentation of lessons (and labs)
• Assist in general chemistry lab at BU
• Introduce/Reintroduce guided inquiry lessons
• Develop activities
What we do... *Chemistry Topics*

- **Examples**
  - dimensional analysis activity
  - stoichiometry concepts
  - particle & species views
  - chemical reaction concepts
  - others

What we do... *Laboratory*

- Perform experiments common to high schools *(prof & student presentations)*
  - Identify “Purposes”
    - Chemical
    - Pedagogical
  - Students critique, sometimes rewrite
  - Discuss inquiry emphasis
- Use equipment common to high schools
What we do... *Laboratory*

- **An example: The Popcorn Experiment**
  - Previous student teacher presentation
    - mass change from kernels to popped corn
    - I presented to “class” as student teacher did
    - Class performed experiment
  - Assigned to critique and rewrite materials – discovery/guided inquiry
  - Re-presented with changes
  - Final product – student and prof input

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What we do... *Laboratory*

**Vernier – LabPro Equipment**

- Acquaint use with TI calculators
- Try different experiments with various probes
What we do... *Laboratory*

- Troubleshoot freshman labs
  - Geometry/molecular modeling/Spartan activity
    - Review of principles
    - Critique of written instructions
    - Learn modeling software

- Fire Safety
  - Local High School Teacher
    - Volunteer fireman
    - Hazmat officer for FD
    - Discussion of combustion
    - Demos related to fire
    - Added topics
      - Recent renovation
      - Other words of wisdom
What we do... **Stockroom Design**

- **Project**
  - To learn how things are supposed to be in a stockroom
  - Students given a blank room and inventory
  - Must make it a stockroom
    - Furniture
    - Safety equipment
    - Organization of chemicals and supplies
    - Special storage units
  - Obviously, an ideal situation

What we do... **Resources**

- *Journal of Chemical Education*
  - Required to subscribe
- Flinn Scientific materials
- *The Chemistry Educator*
- Other print and online resources
- ACS resources
What we do... \textit{Workshops and Conferences}

• PSTA Conference
  (Pennsylvania Science Teachers Association)

What we do... \textit{Resources they take with them}

• Ton of tips
  - Lab tips - organization, safety, storage
  - Teaching tips
• Lab experiments
• Guided inquiry team exercises
• Identifying misconceptions
• On line resources
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