Department of Chemistry  
CWSEI Progress & Plans  
April 28th, 2008  
Jackie Stewart, Skylight Research Associate

Current CWSEI Projects

- **First Year Laboratories**  
  - Committee struck in January of 2007  
  - To discuss labs at all levels of the curriculum
- **CHEM 233 – Organic Chemistry for the Biological Sciences**  
  - Several iterations of redesign (Skylight)  
  - In-class guided inquiry activities  
  - Formative assessment (online homework, problem sets, clickers)  
  - C-LASS survey (learning attitudes)  
  - Validation interviews with organic chemistry students

First Year Courses

- **CHEM 111/113**  
  - Students without grade 12  
  - 4 hours of lecture & 3 hours of lab per week  
  - Enrollment of ~220/150
- **CHEM 121/123**  
  - 3 hours of lecture per week  
  - Alternate weekly 3 hours “wet” lab and 3 hours of “dry” lab  
  - Carefully developed guided-inquiry labs  
  - Enrollment of ~1700/1400
- **CHEM 154**  
  - Engineering students  
  - 3 hours lecture per week & 3 labs per term

Committee Members

**Lab Committee**
- Michael Blades  
- Guillaume Bussiere  
- Ed Grant  
- GrenPatey  
- Subramanian Iyer  
- Mark Thachuk  
- Dana Zendrowski

**Evaluation Sub-Committee**
- Brian Cliff  
- Greg Dake  
- Neil Dryden  
- Derek Gates  
- AnkaLekhi  
- Sophia Nussbaum  
- Laurel Schafer (chair)  
- John Sherman  
- Jackie Stewart  
- Peter Wassell

Issues

- Perception that students are not retaining lab skills from first year  
  - UBC among the lowest in wet-lab hours of Canadian universities (chemistry)
- Guided inquiry vs. traditional
- Extent of practical skill development  
  - Most students will not major in chemistry
- Extent to which labs reinforce lecture concepts

CWSEI Opportunity

- Focus on CHEM 123  
  - Evaluation of guided-inquiry labs  
  - Optimize wet vs. dry lab learning experiences  
  - Potentially increase wet/dry lab hour ratio
- Add to the scant literature on labs  
  - Lack of assessment tools  
  - Lack of evidence that a lab experience enhances learning of concepts  
  - Flawed design of many studies
Purpose of Labs

- Defining learning outcomes
  - Broad range of students
  - Not logistically possible to sync up lab to lecture
  - Practical skills/chemistry content/scientific thinking
- Cognitive/psychomotor/affective
- Deciding on a pedagogical approach
- TA inconsistencies

Challenges

- Perform common laboratory procedures correctly
- Think critically
  - Recognize whether results and conclusions "make sense"
- Interpret data and report data effectively
- Present results in a clear and concise manner
- Prepare in advance for laboratory work

Priority Learning Outcomes

- Process
  - Is the lab course functioning as intended?
- Outcomes
  - Are the desired outcomes being met?
- Interactions between process and outcomes
  - What aspects of the course are responsible for the various outcomes?

Evaluation Components

- Process
  - Is the lab course functioning as intended?
- Outcomes
  - Are the desired outcomes being met?
- Interactions between process and outcomes
  - What aspects of the course are responsible for the various outcomes?

Goals & Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Activity</th>
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<tbody>
<tr>
<td>2007/2008</td>
<td>Define learning goals for first year labs</td>
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<td>Conduct preliminary studies (surveys and interviews)</td>
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<td>2008/2009</td>
<td>Plan evaluation strategy</td>
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<td>Establish baseline</td>
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<td>Refine labs/design new labs</td>
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<td>2009/2010</td>
<td>Implement changes to labs</td>
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<td></td>
<td>Collect data</td>
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<tr>
<td>2010/2011</td>
<td>Implement refined labs</td>
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<tr>
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<td>Collect data</td>
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Preliminary Data

- Committee members visited labs and informally interviewed students
- Pre/post course surveys
- Post-dry lab/pre-wet lab surveys for several experiments
- Student interviews
  - Perceptions of what the lab was about, what they think they were supposed to learn, reflection of wet lab experience
Looking Ahead

- STLF starting in August
  - Jennifer Duis, PhD in Chemical Education
    University of Northern Colorado
- TA training grant (VP Academic)