Biology 140 Renewal: Responding to student feedback

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Biology 140 Laboratory Investigations in Life Science

- First year laboratory course

- Large enrolment (1500 students/year)
  - Each section ~ 24 students

- 3 hr lab once/week (no lecture component)

- Required for life science majors, some non-UBC med schools
Biology 140 Laboratory Investigations in Life Science

- Inquiry learning
- Design & conduct lab experiment
  - Effects of abiotic factors on animals
  - Marine & terrestrial term
- Group work
- Write scientific paper
- Field study
The challenge... student experience

- Low student satisfaction (yearly course evals, past student survey)
  - Workload
  - Assessment clarity and expectations
  - Authenticity of research experience
Challenge: student perception of workload (compared to other labs)

- 73%: Higher/much higher than average
- 22%: Typical
- 4%: Lower/much lower than average

n = 732
Challenge: student perception of workload

- Reduce workload / increase credit # (37%)
- Clearer expectations (12%)
- Marking consistency (9%)
- Include rubric (6%)
- Complete overhaul (6%)
- Other (29%)

n = 449
Challenge: Assessment expectations lacked clarity

“Assessment criteria and expectations for assignments were clearly outlined.”

- **Strongly Agree/Agree**: 42%
- **Neutral**: 22%
- **Disagree/Strongly Disagree**: 36%

n = 730
Challenge: Student perception of inauthentic research

Despite learning real techniques, students perceive an inauthentic research experience

“We all know the research we are doing is unimportant.”

“I felt a very large disconnect with the material”

“Contrived”
Prioritised and streamlined tasks and assignments

• Prioritised:
  – scientific investigations (lab & field)
  – written communication
  – anything that did not support those goals was removed

• Individual $\rightarrow$ group assignments

• Standardised outside of lab format: readings/video & quiz
Clarifying assignment expectations

Provided clear and explicit instructions in standardised format for all assessment

Introduction Assignment Instructions

Weight: 10% of your final Biology 140 grade
Word count: maximum 700 words
Due date: beginning of your Week 7 Lab

This assignment is the first part of the scientific paper you will be writing in this course. In the introduction of a scientific paper, authors provide background information about the organism or the biological system of interest, state the objective of the study including the specific questions they addressed and/or the hypotheses they wanted to test, and justify the importance of the study by addressing how or why the specific topic being investigated is relevant to the scientific field. Refer to ‘Scientific Paper Structure’ in the Scientific Conventions for more content and format information.

Specific Content requirements

Animal and its natural habitats:
- Include the animal’s common and scientific name;
- Describe the geographic distribution of your animal and the habitats (not merely ecosystems such as temperate forests) where your animal is found;
Clarifying assignment expectations

Developed and provided grading rubrics for all assignments

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<th>Content:</th>
<th>25 marks</th>
<th>2 Information and format correct throughout</th>
<th>1 Either information or format incorrect</th>
<th>0 Info completely missing or both info and format incorrect</th>
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<td>Common and scientific names of organism</td>
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<td>Description of distribution &amp; habitat</td>
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<td>Distribution and habitat fully described</td>
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<td>Description of behaviour; explanation of importance of behaviour to biology of organism</td>
<td>4</td>
<td>Behaviour fully described; importance fully explained</td>
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<td>Reasoning connecting behavior to well-being, evidence from literature and integration of literature (for</td>
<td>4</td>
<td>Logical reasoning, supported by relevant evidence from the literature, literature well-integrated (no</td>
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Increasing research authenticity

Increase visibility of UBC research: make explicit links to skills and procedures learned in Bio 140

- UBC research scenarios, multiple times throughout course
- Beaty Biodiversity Museum activity

Scenario 2

Professor Avilés’ student Mark is very interested in the intricate webs that some spiders build. Web building is a process that requires energy. First the spiders need energy to make the silk (which is the strongest natural material!); then they have to move around between branches and other structures to attach the silk and construct the web, which also requires energy.

In one species of spider that Mark studies, he noticed that while some individuals build simple webs, others build very complex webs. Mark decides to find out if
Increasing research authenticity

- Feature UBC researchers in targeted videos
  - Chris Harley (Biodiversity)
  - Allan Carroll (Forest Entomology)
  - Amy Angert (Botany)

Video Clip
Has it worked? Workload

Student-reported time spent each week outside of class: 3.5 h (±2.7 SD)
Has it worked? Assessment Expectations

“Assessment criteria and expectations for assignments were clearly outlined.”

n = 154
Before submitting your written assignments, did you use the grading rubrics to evaluate your own work?

- Yes, always: 67%
- Yes, sometimes: 28%
- No, never: 5%

n = 153
Has it worked? Authentic research

Focus group feedback:

“I actually do [feel like I conducted real biology research], yeah!”

“In a way, yes [I feel like I conducted real biology research]”

“I remember just sitting there and watching a snail ....and that was it for three hours...and I know that that’s part of scientific research and that probably means that I’m not interested”
Other aspects of Biology 140 Renewal

• Increased scaffolding activities: paper writing and experimental design
• Beaty Biodiversity Museum activity
• Long term goal: increase repeated practice
  – balance adding scaffolding activities & workload
• Evaluation: prelim data suggest improvement in student performance (pre-post)
• TLEF: instructional resources
• Chat to us at our poster session later today!
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• TAs