



## Is there a Place for Inquiry in First-Year University Biology Labs?

### Background

Trinity Western University (TWU) is a small private post secondary institution situated rurally in Langley, B.C. where it serves about 3000 students who are primarily Canadian, American, and Oriental. Freshmen biology lab students come from a ~~major~~ course and a ~~minor~~ course in proportions of 70% to 30%. In the traditional first-year biology lab, students often rush through predetermined procedures with little comprehension of what they did or why. By changing the format of several labs to a hybrid model involving some inquiry activities, the intent was to see all students become more engaged in the process of scientific investigation.

### Research Questions

How does the students' understanding of concepts compare between using inquiry and using a more traditional approach in a first-year university biology lab?

-What is the impact of the inquiry approach on the students' attitude, and engagement in, the lab experience?

-Is there any noticeable difference in the impact of the inquiry approach between the biology lab experience of majors and ~~nonmajors~~?

-How does the implementation of inquiry affect any instruction of the first-year biology lab and any attitudes and behaviours to teaching?

-How does the use of inquiry impact the long-term mastery of concepts for first-year biology students?

-Should the inquiry approach be adopted as a routine teaching technique for first-year biology labs?

### Student Sample

A subgroup of 38 students was selected out of the total of 107 first-year biology students. The students are chosen from those who volunteer to be part of the project, so that there will be 10 ~~nonmajors~~ and 28 majors representing all achievement levels. Most of the students have had little exposure to inquiry learning.

### Treatment/Design

During a traditional lab working with the enzyme, ~~peroxidase~~, baseline data was collected. This was followed by two hybrid model labs that utilized inquiry activities such as ~~using~~ ~~chromatography~~ and ~~cellular respiration~~.

### Data Collection Methods

Research Questions	Data Source 1	Data Source 2	Data Source 3
Focus Question	Pre and Post <del>Surveys</del>	Pre and Post Interviews with Concept Maps	
Question 1	Pre and Post <del>Surveys</del>	Pre and Post Interviews with Concept Maps	Observer using Rubric
Question 2	Pre and Post <del>Surveys</del>	Pre and Post Interviews with Concept Maps	
Question 3	Journal Entries	Pre and Post Interviews	
Question 4	Delayed Surveys	Delayed Interviews with Concept Maps	
Question 5	Pre and Post Surveys	Post and Delayed Interviews	Journal Entries

### Results

Data results from preliminary inquiry activities showed that some students preferred this method of doing labs, while others resisted changes to how they were familiar with performing labs. All students were observed to think more deeply in the treatment labs. The hybrid model of labs, involving some inquiry, did enhance learning, stimulated interest, and better prepared students for future research opportunities. From these results inquiry activities are recommended for university science labs since conducting inquiry promotes original thinking.