Attempts at Integrating Quantitative Activities in “Rivers and Streams” Lab for Introductory Geology at CSU Chico

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The Need

The Introduction to Physical Geology laboratory exercises are in the midst of a “redesign” phase. New and revised activities must comply with a variety of factors including scheduling, multiple sections (up to 18 separate lab sessions), multiple instructors (graduate student TAs’s), a variety of skill levels in science and math (Freshman/Senior grade level students, including some with college level math, and some without) and a wide range of experiences in geology (e.g. rock climbers, avid kayakers, and urbanites without interest or experiential background in outdoor pursuits).

The Set-up

The Rivers and Streams activities are among the first to be redesigned with overarching goals for content and ancillary goals for skills building.

Overarching Goals for Content:
• Students collect and synthesize data from a local stream
• Students use quantitative reasoning skills to synthesize and compare data sets collected from different locations and in different seasons.

Ancillary Goals for Skills:
• Students collect, complete algebraic calculations and graph data
• Students build quantitative reasoning skills
• Students collaborate in data collection & making interpretations

The Attempt

Three activities shown below were designed with the following considerations:
1. Students need more experience using quantitative methods (multiple activities)
2. Students need to understand data collection techniques and limitations
3. Students need to synthesize data in tables and graphs to understand the significance of data sets

Week 1: The first data collection activities introduce the idea of collecting and using data & set the stage for quantitative activities in the course. Students use pace and distance to determine stream velocity of Big Chico Creek, on campus.

Week 9: Students go on a fieldtrip upstream of campus to examine the geology and stream flow data.

Week 13: Students complete pre-work to compare the types of calculations to be completed in the “Rivers & Streams” lab activities. Pre-work gives students the opportunity to seek extra help prior to the lab activity.

Week 13: Students return to Big Chico Creek to collect stream flow data.

Week 1: Campus Walk

The Campus Walk introduces a variety of topics in a “preview” format for future labs. This lab is intended, but is general enough that students who add the course late are also able to survive later topics. The activities also gives students the sense of the rigor of the course and the first set of (simple) quantitative experiences. Measurements are collected for Big Chico Creek on campus (dashed square on map at right).

Week 12: Pre-work

Pre-work activities give students a review of a) concepts (hopefully covered) in lectures and b) calculations used to describe stream flow. Pre-work also gives students the opportunity to seek help with calculations from their TA’s before the Rivers & Streams Lab.

Week 13: Rivers & Streams

After completing pre-work, practice calculations, and determining their pace in previous activities, students are prepared to collect another stream data set and compare new and previous data. As this activity is used in additional semesters, labs will incorporate data from previous semesters, so that data collections will include: Late August, October, December, January, March, and May measurements.

Week 9: Fieldtrip

One of two fieldtrips visit the Bidwell Park, upstream of campus along Big Chico Creek (in circle at right). Along with examining the geology of the park, students also collect stream flow data.

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