Introduction and Objectives

We seek to develop new pedagogical methods for teaching field geology to undergraduate students. Studies on the way expert geologists map in the field may assist in that process. One of the field courses at the University of British Columbia, EOSC 328, provided us with an opportunity to study both experts and novices in a novel field setting. The course, a two-week field school offered to 3rd year students in our Earth and Ocean Science program near Oliver, BC, contains two, 5-day bedrock mapping exercises and a number of 1-day Quaternary geology exercises. Six experts (2 Instructors, 4 Teaching Assistants) and 18 student pairs (36 students) participated in the study.

Study Objectives

1) Identify expert mapping behaviors and characteristics through direct observation in the field. Can this behavior be summarized and used to model “ideal” behavior or mapping skills for students?

2) Observe student in the field to determine degree of expert-like behavior. Are there ways of identifying student behaviors that may indicate early on which students may require additional assistance or specialized mentoring?

Methodology

Video interviews of participants and GPS units used to record participant location while mapping were used. Interviews were of two types: (1) focused interviews with a series of questions and (2) relatively informal interviews conducted with actively mapping pairs.

Interviews: During interviews of type (1) , which were conducted both in the field and back at camp, students and experts were asked to show on their map and then explain what their mapping plan or path had been prior to the initiation of mapping that day. They were then asked to explain what they had seen and to state how their plans had changed, if at all. Type (2) interviews were conducted ad hoc, usually of experts or students mapping naturally in the field. Over 15 hours of video footage were collected and transcribed.

GPS Tracking: Garmin eTrex units were obtained and placed with each mapping pair. The unit recorded a location every 10 seconds; participants were asked not to manipulate or attempt to read the devices. The data produced tracks of movement through the field area while mapping although some units did not collect complete data sets each day due to reception and power issues.

Results: Interviews

From video footage of expert and student interviews, a number of general observations can be made.

Expert Interviews and Observations

In general, the expert mappers were found to have:

• Superior technical abilities (sketching, compass use, etc.)

In addition, experts tended to be:

• More efficient at locating themselves and making field observations

• More likely to make sketches and draw cross-sections to enhance understanding

• More likely to describe geologic models seen elsewhere as a way to understand the current geologic problem

Despite these qualities, experts were often as challenged by the geology as students were.

Student Interviews and Observations

Students who performed better on mapping exercises were:

• More likely to make predictions (not necessarily correct ones, but actively making and testing predictions).

• More likely to produce flexible field strategies (e.g. were more likely to change plans to follow interesting or suggestive data or to stop work that appeared fruitless).

• More likely to make sketches to improve understanding.

Initial Interview Implications

Based on these observations, students would likely benefit from instruction that requires students to increase the amount of sketching and cross-section creation they do in the field (e.g. exercising 3D spatial skills). Experts and high-performing students also tend to make, and test, predictions while in the field, something that could be included explicitly as part of a mapping exercise or field-based curriculum.

Geologic Expertise and Field Mapping: Lessons from a 3rd year undergraduate field school

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