

Paper Number: 2431

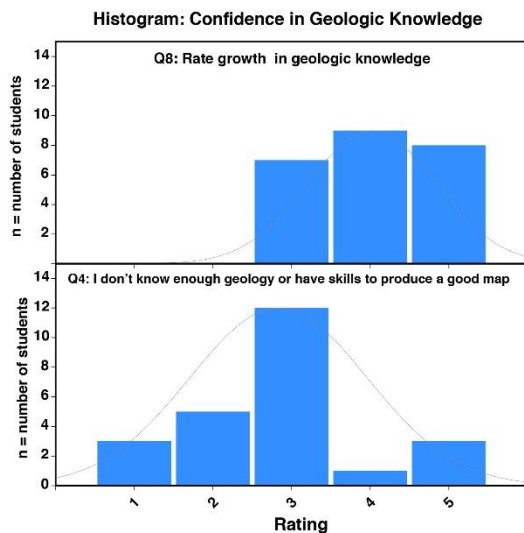
Gauging how novice geologists process and learn in first field experiences

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Field-based courses at the university level are logistically difficult, but an essential part of the learning process in geology. We present a pilot study of student data related to two weekend-long field trip excursions (Grand Canyon, AZ; Rainbow Basin, CA) in the fall semester for a required course (GEOL200) for all majors and minors in Geological Science, at San Diego State University. Prior to their first field experience, considerable time was spent introducing the students to topographic maps and basic mapping skills using a Brunton compass and protractor. Through post-field surveys, we captured data to better understand how novice geologists master basic field techniques and spatial thinking, and how they decipher the geologic story of a new field area.



After an introductory group-paced field trip to the Grand Canyon, data (Likert scale from 0-5, least to most) shows that all students felt their geologic knowledge was growing (avg=4.0). Majority of students also felt they had the basic geologic knowledge and skills from previous classroom experience to produce a good map (avg=2.8). Students were asked if it was useful to talk to others versus doing work on their own. Results show they find it highly beneficial to talk to others in the field, while their preference for working independently was varied, displaying a broad symmetric distribution range. Overall, we found it was a successful first field encounter and provided convincing motivation for field geology.

Figure 1: Geologic knowledge, after trip 1

Next, two days (group mapping, independent mapping) were spent in Rainbow Basin, CA and after short-answer surveys were distributed. In comparison to the first survey, students felt more comfortable working independently after completing their first field exercise alone (third experience overall). When asked to describe how they managed their time mapping by themselves, 22% reported they didn't manage their time well and couldn't map the whole area, and despite identifying poor time management, another 26%, could clearly describe their planning and identified what they needed to do differently next time mapping. For example, one student stated, "I ended up taking too many attitudes in the beginning and not enough towards the back of the canyon. Next time I need to plan more about what I need from each section on the map so I don't need to back track so much". Internal, personal reflection about learning and the process are key to student success in independent mapping. Finally, ~30% of students expressed confidence on the points on the map.

From results, we gathered important information about the way we would conduct future field trips for GEOL200. Changes implemented included: providing students with a Google Earth image and directing students to reconnaissance the entire map area in the first hour. We conclude that having three field experiences, where students become gradually more independent, prepared them to manage their time and accomplish their first individual geologic map. The educational journey of a novice geologist is different for each student and we aim to provide them with the safe, encouraging space to explore and survey a new field area, in order to develop basic field skills and establish literacy in the geosciences.

