A comparison of advanced and introductory geology student's visual behavior using eye-tracking technology

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Geology instructors commonly use photographs to teach students about landscapes and geologic processes. These photographs commonly contain humans or inanimate objects to relate the scale of the photograph. Our previous eye-tracking research with introductory geology students has shown that these scale objects can serve as distractors by pulling a learner's focus from pertinent content. Introductory geology students can be categorized into three groups, low, moderately, or highly distractible, based on how they visually interact with inherent distractors used to show scale in geologically-rich landscape photographs. These distractibility classifications are defined by the number of visual fixations that occur between distractor examinations, with 1 to 3 fixations between distractor examination being highly distractible, 3 to 10 fixations corresponding to moderately distractible, and tens of fixations between distractor examination corresponding to low distractibility. Additionally, introductory geology students generally focused on the center of photographs, visually neglecting the edges. In other research, we found that using callouts to signal introductory students to the relevant geology affected how he or she visually interacted with distractors. Students who looked at scientific images that had callouts pointing to pertinent information, compared to students who did not receive callouts, looked at the distractor less, looked at more of the image, and looked at more pertinent geology longer.

In the present research, we eye tracked 5 advanced geology students while they looked at geologically-rich landscape photographs in an effort to compare their eye-tracking data to the novice students described above. Preliminary results indicate advanced geology students, who are considered to have a mastery of the subject, show behaviors similar to or exceeding those that were defined as low distractibility; the number of fixations that occurred between distractor examinations were generally between 5 and 20. As a result, advanced geology students looked at the distractor less. We found that for all cases, the advanced geology students visually scanned more of the photograph than the introductory students. In addition, advanced geology

students did not visually neglect external portions of the photographs, and instead fixations tended to occur from edge to edge.

These results reflect one component of our investigation aimed at better understanding the difference between novice-expert behavior differences in geoscience learning. Additional data analysis remains to be completed. We intend to compare data between introductory and advance geology student to determine if the interfixation degree (saccade length) differs between groups, if the timing of short and long fixations (which may correspond to local vs. global inspection, respectively) differs between groups, and when advanced geology students look at distractors.