Student Interest in Introductory Geoscience Laboratories at three Universities

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Context, Research Questions
Geoscience students often attribute their decision to major in geoscience to positive experiences in introductory courses. We measured student interest in two geoscience labs that were offered online during the COVID-19 pandemic to see how interesting they were for introductory students. We then compared student interest to learning, hypothesizing increased interest in lab content would help online students learn more.

Questions
• How interested are students in labs focusing on plate tectonics and minerals? Does student interest vary across universities?
• How much do students at each university learn about plate tectonics and minerals after completing the labs?
• Is individual student interest related to learning?
• We hypothesize that students who are more interested within a particular subject would be more motivated, thus would be more likely to have higher learning.

Background

Student Interest
• Student interest is correlated to student motivation to learn and persist within a subject area (Van der Hoeven Kraft, 2017).
• Interest drives effort, self-regulation, goal setting, and self-efficacy, but is not necessarily correlated to academic achievement (Van der Hoeven Kraft, 2017). In an online learning environment, these traits may lead to higher learning (Xu & Jaggars, 2014).

Linking interest to learning
• Students with low grade point averages struggle disproportionately in online classes (D’Alessio et al., 2019).
• Students who are more successful in online classes often are more highly motivated students and may have higher levels of self-regulation, self-discipline and metacognitive skills (Xu & Jaggars, 2014).

Class Context
• Data from two introductory labs were included in this study: Minerals labs required students to examine maps and analyze correlations between plate tectonic features, which is easier to do online.
• Data from three universities offering similar online labs were included in this study: Two east coast public universities with similar demographics, Universities 1 and 2 and one public Hispanic serving institution from the southwest, University 3.

Methods
• Surveys measured students’ perceived interest immediately after completing labs during Spring 2021.
• Pre- and Post- content surveys were used to determine student learning at the beginning and end of the semester.
• Interest and learning data was analyzed using R by computing Mann-Whitney and hedges’ g tests.
• Pre- and post-content surveys were matched with interest and demographic data for individualized analyses.
• Labs were analyzed to identify similarities and difference likely to explain patterns in data

Results: Learning

Plate Tectonics Learning
Survey respondents were asked to select the positions of the Earth's continents and oceans. The correct answer varied with seamounts occurring on land. Which map do you think most closely represents the places where these seamounts are typically observed?
• University 3 had more students get this question wrong on the post-test compared to the pre-test.
• More University 1 and 2 students got this question right on the post-test compared to pre-test. The increase was higher at University 2.

Mineral Learning

Question: Which of the following statements best reflects geoscientists' thinking about rocks and minerals?
• Both University 2 and 3 had around 10% more students get this question correct on the post-test compared to the pre-test.
• Both University 2 and 3 had higher scores on the pre-test question for minerals than for tectonics.

Results: Interest

Interest in Plate Tectonics Labs

Tectonics labs at University 1 and 3 had similar interest levels across universities. However, the interest in University 1 students was lower than in University 3 students. University 3 had more students interest in the minerals lab, and had a higher percentage of individuals (36.80%) improve on the post-test.

Differences across universities:
• Universities 1 and 2 had more students who answered correctly on pre-test, suggesting they were more interested in the minerals lab, while University 3’s students scored declined.
• University 3, the Hispanic-serving institution, showed higher interest in tectonics and lower interest in minerals than the other institutions.
• Students at University 3 were more interested in Tectonics than Minerals, but learned more from the Minerals lab.
• Factors other than interest, e.g., other variables related to self-regulated learning, may explain observed patterns. Identifying these factors may help instructors design online labs that help students succeed and continue their education within geosciences.

Implications/Future Work
• Interest does not correlate to learning for these labs.
• The plate tectonics lab has similar interest levels across universities. However, student learning differed, with University 1 and 2 students improving on the plate tectonics question while University 3's students scores declined.
• University 3's students had a lower overall interest in the minerals lab, but had a higher percentage of individuals (36.80%) improve on the post-test.

References

Next Steps:
• Analyze individual demographic data to determine if these variables influence interest and learning.
• Analyze the inquiry level of lab activities to determine if this influences interest and learning.
• Examine changes in student interest for every lab over the course of the semester.

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