GEGN 468 – Engineering Geology and Geotechnics is a senior level course which also typically has significant student enrollment. The course is intended to familiarize students with the connections between geology and engineering and to provide students experience with the geological engineering design process. The course currently has seven primary learning outcomes, but this study is focused on a single outcome related to communication:

"Students completing this course will be able to concisely communicate data collection, data analysis, and design processes and results to a technical audience in written and oral formats using appropriate technical vocabulary and graphical aids."

In particular, the following research questions were considered:

- To what extent is writing performance correlated with other broader indicators of student academic performance?
- To what extent does repeated feedback and writing practice enhance student written communication skills?
- To what extent do the attributes of individual peer reviewers influence a student’s performance improvement based on the peer feedback they receive? And which peer reviewer attributes are most consequential?
- To what degree is peer, and instructor assessments correlated?
- To what extent does repeated feedback and writing practice improve student self-efficacy?

Methodology

During the first week of classes, a technical report writing workshop was held for the students and TAs of GEGN 468. This session began by going over the technical report rubric that was used for the entirety of the course (including peer and final evaluations); this included a full-class discussion of each of the individual rubric elements:

- Data collected for 37 students
- 7 report topics (draft and final submissions for each)
- Peer review and self-assessment (using rubric) for draft reports
- TA evaluation of final reports
- Results analyzed through regression analysis, considering overall performance and individual rubric categories

While the importance of engineering geology technical skill development has been noted in recent publications, the need for written communication skills development in engineering geology has long been recognized (Matheson, 2003; Sant & Higgins, 2005).

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Results from multivariate regression considering reviewer final grade and a student's draft grade as predictors of that student's performance improvement from draft to final report in all rubric categories.

Results from regression analysis considering GPA as a predictor of performance improvement in different rubric categories over the course of GEGN 468.

Results for linear regression analyses considering individual rubric categories and overall report grades:

CONCLUSIONS

- Marginal benefit decreases after first three assignments in a row.
- Students saw the most significant improvement in terms of four aspects of communication of rubric performance: “Transparency”, “Completeness”, “Style”, and “Graphics”
- “Formatting” and “Structure” grades were found not improve significantly over the course of the semester.
- GPA was found to be correlated with technical report writing performance in GEGN 468; the magnitude of the effect of GPA on performance was found to decrease over the course of the semester.
- Reviewer performance on a given report topic was found to predict reviewer quality, but Reviewer GPA was not.
- Reviewers with strong performance in the “Graphics”, “Style”, “Technical Accuracy”, and “Interpretation/Design” rubric categories provided reviews which lead to significant improvements in these same four categories.
- Student self-efficacy related to written communication was found to improve significantly.

REFERENCES


Dr. Walton teaches courses in Applied Numerical Methods, Engineering Geology, and Data Analysis

Dr. Gabe Walton, Department of Geology and Geological Engineering

STUDY CONTEXT & FOCUS

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