Bridging the Writing Transfer Gap in Early Engineering Laboratory Courses

This multi-institutional project aims to serve the national interest by improving college writing instruction and the technical writing abilities of engineering students. Although writing is a critical skill for engineers, employers frequently complain that engineering graduates need better writing skills. Undergraduate engineering curricula typically require various general education writing courses early in the program of study. However, engineering educators often do not have the tools to connect students' learning from early writing courses to their writing in engineering courses. The goal of this project is to improve the transfer of writing skills from college writing courses into engineering courses. To accomplish this goal, the project will develop an instructional module to facilitate transfer of writing skills from writing courses into the laboratory component of engineering courses. It will also evaluate whether the instructional module enhances student writing of engineering lab reports. This project expands on a previous project that demonstrated success in this approach at one institution. In this follow-on study, the writing module will be further refined and implemented at multiple institutions. The partnering institutions were chosen because of differences in the general education writing course requirements for their engineering students. Thus, this research study could identify writing instruction strategies that are transferable across different types of institutions.

This Engaged Student Learning project will identify what transferable knowledge students bring from three far-transfer models: concurrent transfer in which students build on first year composition and technical writing courses; vertical transfer in which students have only completed first year composition; and absent transfer in which students have completed a literary course but lack both technical writing and the preparation in composition that is characteristic of first year composition. The collaboration includes at least one institution representing each of the three models, enabling exploration of two key research questions: “How can writing transfer be adapted across the US to a wide range of writing curricula in lower-division courses?” and “How can a transfer-focused writing module be implemented effectively in diverse engineering lab classrooms taught by any instructor?” Informed by a mapping of students' collective zone of proximal development, a lab report instructional module will be refined by adapting multiple scaffolds to support students' incremental engagement with lab report writing as engaged disciplinary learning. The module will include direct instructional materials and reference materials as supports for writing lab reports. The project will conduct quantitative and qualitative assessment of students' lab report writing as disciplinary meaning making, as well as students' development of technical communication skills. Results from this integrated mixed methods approach has the potential to advance knowledge about the impact of transfer focused writing pedagogies on students' lab report writing competencies. This project is based on results from an exploratory project that showed statistically significant improvements in engineering students' lab report quality after implementing a writing transfer-focused lab report module at two institutions utilizing a vertical transfer model. These results suggest that a student-centered pedagogical approach that explicitly reinforces writing knowledge and skills from prior post-secondary writing experiences can be more productive than the traditional case study approach often employed in engineering writing instruction. With these encouraging prior results, the results of this project have the potential to be applicable to diverse engineering laboratory course settings across diverse engineering curricula. This project is supported by the NSF Improving Undergraduate STEM Education Program: Education and Human Resources. This program supports research and development projects to improve the effectiveness of STEM education for all students. Through the Engaged Student Learning track, the program supports the creation, exploration, and implementation of promising practices and tools.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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