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Title: “Mathematicing” and Writing Across the Engineering Curriculum

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Abstract:

This project responds to university efforts towards improving student success, retention, and career engagement upon graduation. Educators know that student success and timely graduation depend on successful outcomes in general mathematics courses. Most of these courses, designed for both science, technology, engineering, and mathematics (STEM) and the humanity paths, depend heavily on students’ ability to read and write well.

Many institutions have long realized that writing should be an integral part of all subject areas, and calls for “Writing Across the Curriculum” are heard across most if not all campuses. Our project proposes a reverse approach: including mathematics (and particularly statistics to start) in a writing course as a first step to make “Mathematicing Across the Curriculum” as common as its written counterpart. In this project, administration and faculty in mathematics, engineering, and English collaborate to incorporate a data analysis component in a course called Technical Report Writing (TRW) and, ultimately, future plans include an integration of mathematics in other humanities courses.

This multi-disciplinary, collaborative approach involves three stages. The first stage, already completed, involved a two-year process of re-envisioning the TRW course to meet the needs of the university’s nationally-ranked College of Engineering students. Faculty in mathematics, engineering, and English developed a data analysis component to the course, followed by a year-long session in which the lead faculty members of the mathematics and English areas trained all TRW professors to teach the data analysis component using a workbook developed by the mathematics professor. All sections of TRW now include a major report assignment based on categorical data analysis.

However, recent data results obtained during the second stage of the process, involving classroom research, determined that both honors and traditional students could tolerate a higher level of statistics in a writing course, so these results helped us to refine the data analysis component, such as revising the workbook, developing new assignments, and planning to add a numerical data analysis assignment (focusing on mean, median, mode, standard deviation, and Pearce’s Index of Skewness) to the course. The project is now entering its third and final stage

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which will focus on more English faculty training. However, during this final stage we noticed some unexpected “ripple effects” that are now occurring as a result of our success with this course collaboration, such as a new Mathematics Writing Certificate, a new proposed course, and a new effort to persuade other disciplines to include transparent mathematics components in their curriculum, based on the model we’ve demonstrated.

We have found that collaboration of different disciplines and academic units across the curriculum, using both mathematics and writing, can and continues to create an engaging and authentic learning environment that helps students reach a deeper, more holistic understanding of their disciplines while also helping programs to improve their assessment of student learning outcomes at graduation.