[GIFTS] Developing Data Literacy through the NAE Grand Challenges and MATLAB App Designer

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A semester-long project in a second-semester, first-year engineering course was developed to provide students with an open-ended, collaborative opportunity. Using the fourteen National Academy of Engineers Grand Challenges, students initially investigate and find quantitative information (data) related to a grand challenge. Students are provided peer mentors (undergraduate teaching assistants) and asynchronous learning modules to support narrowing the topic, identifying the challenge and information they want to present, and finding data. The goal for each project is to develop a MATLAB App that allows the user to interact with the data and learn about the Grand Challenge. With regular weekly checkpoints, students are asked to develop each component, receive, and address feedback, and reflect individually on their work. Weekly deadlines alternate between project checkpoints and reflections to provide individuals and groups time to understand the feedback received, connect with their team members, discuss with their peer mentor, and develop questions and a plan for the next checkpoint.

Groups are made up of four to six students. Since MATLAB App involves various components, each group member has ownership of a specific component on the interface with the group goal of making sure they integrate. MATLAB is taught as part of this second semester, first-year courses, the program language, and interface are a natural extension of the knowledge they are using regularly in class. As part of the final reflection, use the Likert scale to rate their learning in various objectives indicating a strong student experience and development in key areas such as data literacy, engineering context, and problem-solving. Figure 1 shows a summary of student self-assessed learning from one section in the Spring 2023 semester.

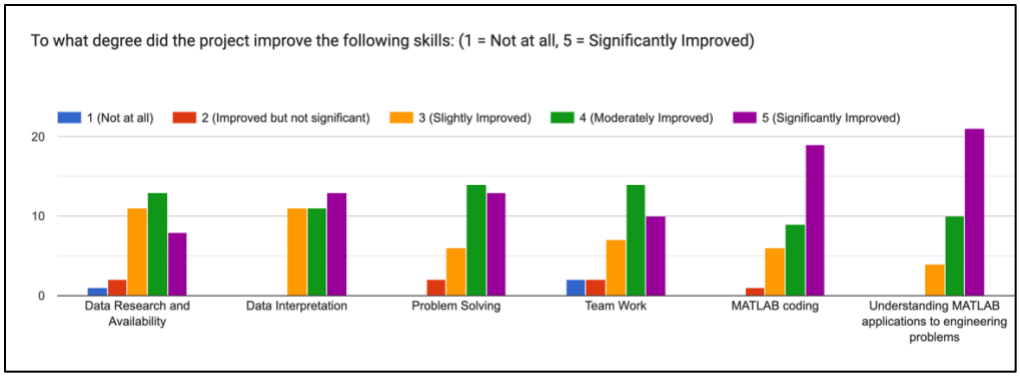

Figure 1: Self-Assessed Student Learning (Spring 2023)

Finally, students communicate their project in the form of a final poster and presentation in class. Having developed these data literacy skills, they are challenged to present their work in an interactive (app) and static (poster) way. As part of an introduction to the UH Grand Challenge Scholars Program, the top groups from each section are selected to present their project at a Grand Challenge Summit as part of a Student Poster Session.