

GIFTS: Preparing First Year Engineering Students for a Career where Communication Skills Matter!

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Communication plays a crucial role in today's engineering workplace. ABET requires engineering programs to demonstrate their engineering students' competency in communicating their engineering work effectively (3.g). Although this skill can be taught and assessed, the results of a survey show that engineering students are inadequately equipped to meet this need [1]. In the project based first-year Cornerstone of Engineering courses at Northeastern University, we are addressing this need by teaching and assessing the three pillars of engineering communication: written, oral and graphical - in addition to teaching new skills in design, technical drawing, and programming.

A series of biweekly group assignments are woven into the project-based curriculum, culminating with a final project exhibition and written reflection. These assignments, called Milestones, assess the presentation, graphical communication and writing skills of the teams as well as their individual leadership skills. The written reports are collected during "Town-hall Meetings" associated with each Milestone. During the Town-hall Meetings the project manager, a role that rotates between the group members during the semester, presents the progress of the project to the class using appropriate visuals and drawings (graphics) prepared in sketching software such as AutoCAD or SolidWorks. At the end of the presentation, the project manager is required to collect a few questions from the class and answer professionally. If their graphics and descriptions are not done well, they receive critical feedback from their peers. This feedback leads to clearer graphical communication and improved oral communication on subsequent milestones.

General assessment of oral communication for the project managers includes: wearing appropriate professional attire, making eye contact with the audience, presenting the material in the allotted time, and evidence of rehearsal via smooth transitions and limited filler words (such as um or ahh.) Assessment of presentation professionalism is based on the quality of the material (graphics, visuals and informative text) in the presentation and the project manager's clarity of responses to the questions posed by the class. The project manager is also further assessed on professionalism in writing as it is their responsibility to organize and edit all materials submitted that week. To add another layer of assessment, simple feedback forms with only two questions (plus (+): what you liked and delta (Δ): what can change) are distributed among the class during presentations. The written feedback forms are then collected by each team and they are required to summarize and professionally address the written comments in the next report and Townhall Meeting.

Approximately two-thirds of the way through the course, students are given a design exam where they are asked to reflect on something they have failed at and what they have done to improve. A majority stated that communication was something they were working on to make sure their goals were met with the final project. By the conclusion of the semester, students' final reflections reported that when working in a group on a project of this magnitude, they must rely on each other to subdivide the work to accomplish their goals. Furthermore, they overwhelmingly reported that they realized good communication was a skill that needs to be developed and constantly cultivated throughout their lives in order to be successful as an engineer.

References

- [1] P. Sageev and C. J. Romanowski, "A Message from Recent Engineering Graduates in the Workplace: Results of a Survey on Technical Communication Skills," *Journal of Engineering Education*, vol. 90, no. 4, pp. 685-693, 2013.