Work in Progress – Taking One for the Team: Goal Orientation and Gender-Correlated Task Division

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Abstract - Assessments of student behavior in first-semester design experiences suggest that early team-based design projects can promote a team performance goal orientation that undermines students’ learning goals. In particular, we find that gender-correlated division of work can easily and unconsciously occur in these teams and that performance-oriented teams may be more likely to undermine women’s learning goals than men’s learning goals. We propose mechanisms to explain the effect and present results of promising interventions.

Index Terms – Goal orientation, teamwork, gender

There has been significant work on the influence of goal orientation on individual performance and learning since the idea was first introduced by Dweck et al. [1]. Dweck’s framework identifies two goal constructs: Individuals who approach tasks with a learning goal orientation value tasks as an opportunity to develop competence and enjoy learning for the sake of learning. Individuals who subscribe to a performance goal orientation view tasks as an opportunity to demonstrate competence – and so, he or she will engage tasks when there is an opportunity to succeed. Performance goals are often regarded as a double-edged sword because students with a performance orientation may adopt defensive strategies in situations where one might fail. Learning goals are generally regarded as more adaptive and have been shown to lead to higher levels of self-regulation, effort, performance, and resiliency [2].

While research has generally focused on individual goals and classroom goals, there has been relatively little work examining goal orientation in teams [3-5]. One model, proposed by DeShon et al., suggests that the team, as an entity, can have a learning goal orientation or performance goal orientation that is distinct from the orientations of the individuals on the team. In this model, individual and team goals interact through feedback: team members constantly adjust their individual behavior by examining performance, and considering both individual goals and team goals.

The question of how a team setting can influence individuals’ learning experiences is relevant in engineering education because of the growing number of team-based projects in undergraduate engineering programs. This challenge is compounded by calls to include students from more diverse backgrounds and to provide more opportunities for team-based projects in the first year [6,7].

In this paper, we present measurements indicating that in an educational setting, performance-oriented design teams can tend to divide tasks along gender-correlated lines that undermine individuals’ learning goals. We discuss possible mechanisms to explain the effect, and suggest interventions that encourage teams and individuals to adopt learning goals. Finally, we present post-intervention results, which suggest the efficacy of our interventions.

The measurements presented here were taken over the course of multiple years in a first-semester, project-oriented design course at a small undergraduate engineering college. Within the course, students design and build biologically-inspired mechanisms over the course of two projects. During the first half of the course, each student individually designs and fabricates a simple toy, inspired by an insect of the student’s choosing. This first project is highly scaffolded, and requires that all students do brainstorming, CAD, 3D sketch modeling, and prototype building. In the second project, teams of 4-5 students take inspiration from an animal of their choosing in order to design and build a more complex toy (e.g., one which swims). The project ends with a demonstration for an external audience of 4th graders, who assess the toys that teams have designed. In the team project, the team is responsible for determining its design process, and for dividing tasks among team members.

In the Fall of 2005, as part of a reflection session on team roles, students were asked to identify their individual level of contribution, from 0% (“I did none of this task”) to 100% (“I did all of this task”) for a variety of tasks (e.g., “CAD”, “Preparing Presentations”) that were done during the team project. Analysis of responses indicated that on a number of teams, individuals were taking exclusive responsibility for given tasks – for example, one individual might do all of the CAD for the team, and another might do all of the presentation preparation. The fact that such division of labor happens is not surprising – it is frequently how professional teams behave – but it does raise potential concerns around the extent to which individual team members are getting to develop skills in this experience.

More troubling was the discrepancy between the tasks undertaken by male and female students. Figure 1 plots the differences in mean female and male reported activity levels across eight task categories. In places there are a significant differences between men and women – indicating that, on an individual basis, certain tasks are dominated by one gender or the other. Men report doing significantly more CAD and prototyping, while women report doing more learning about people’s needs and preparing presentations.
With these strategies in mind, we implemented three interventions. First, we shared the measurements in Figure 1 with students before the team project, in order to make individuals aware of the behaviors that can happen in a team setting. Second, we required all students individually to identify their top two learning goals for the project – for example, a student might note that the wish to get better at CAD and at building prototypes – before the team began planning. Finally, we required that teams, in presenting their work plan for the project, show not only how they were going to succeed in designing and building a toy, but also how they were planning to address the individual learning goals of the team members.

We have utilized these three interventions for two consecutive years, and results are very promising. Figure 2 shows typical results of the task survey post-intervention. As can be seen, the difference in means between men and women is substantially reduced, particularly in the areas that were noted as problematic (e.g., CAD). Further analysis and results will be presented in the talk.

### References


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