

Abstract

The importance of collaborative skills in the workplace is well documented. It is less clear how to develop those skills and how to assess whether a person will be a valuable team player. Students completed a survey in which they evaluated their own teamwork skills and the contribution of their teammates related to a specific project completed in the Engineering Problem Solving course at UTA. Students evaluated their skills on a scale of 0 to 4, with 0 indicating that the team member doesn't exhibit that skill at all and 4 indicating the highest level of proficiency for that skill.

Overall, students rated themselves highly, mostly believing that they and their teammates are good at teamwork. A comparison of the rating on teamwork skills and the grade earned on the project indicates a weak positive correlation, i.e., high teamwork ratings correspond to higher grades on the project. Interestingly, investigation of gender effects showed no difference in ratings between men and women, either as the person doing the evaluation or the person being evaluated. A study of gender composition of the teams (2 or 3 members) showed a clear difference for teams that were composed of two males and one female. Those teams earned lower grades on the project than all other team compositions.

Introduction

For college graduates, employers rated teamwork skills second to oral communication in contributing to job success.^[1] Teams are composed of individuals who share several defining characteristics.^{[2],[3]} They

- have a shared collective identity
- have common goals
- are interdependent in terms of their assigned tasks or outcomes
- have distinctive roles within the team
- are part of a larger organizational context that influences their work and that they in turn can influence

This study focused on the nature and quality of individual team members' contributions to the team. In the academic context, it is important to distinguish between the grade of a group project and the quality of each individual member's teamwork in contributing to that final product.

The Association of American Colleges and Universities published rubrics as Valid Assessment of Learning in Undergraduate Education (VALUE). The teamwork rubric lists 5 standards of performance to be assessed:

1. Contributes to team meetings (Contribution)
2. Facilitates the contributions of team members (Engagement)
3. Individual contributions outside of team meetings (Preparation)
4. Fosters constructive team climate (Positive Climate)
5. Responds to conflict (Resolve Conflict)

These skills are assessed on a scale of 0 to 4, with 0 being 'doesn't exhibit this skill' and 4 being the highest level of skill for each standard.^[4]

Methods and Materials

At UTA, the Engineering Problem Solving course is a high-enrollment freshman-level course required by most engineering majors. Students are placed on teams of 3 and work together, learning to solve problems in a team environment.

Late in the course, students complete a project that involves performing a breakeven analysis on the computer, writing the code in the MATLAB language. Each team member receives the same grade. The project is to be completed in one week and all class time during that week is devoted to working on the project.

A student survey has been developed based on the VALUE rubric discussed above. After completion of the project, students were asked to complete the survey voluntarily and the results have been analyzed for statistical significance among several parameters. Each team member is asked to evaluate the teamwork skills for each team member, including themselves. Students were also asked a question relating to their perception of the expertise of their teammates.

Results*

The total scores students gave each other and themselves in evaluating their teamwork skills were very high, mostly 3's and 4's out of 4.

Comparison of the average ratings for teamwork skills to project grades indicate a positive correlation. Higher values on individual teamwork skills correspond to higher grades on the team project.

No difference was observed in student's assessment of their teammate's expertise regardless of gender of the person doing the evaluation or the person being evaluated.

In the course, the majority of teams are composed of 3 males. It is notable that gender-mixed teams with two males and one female had lower project grades than teams of other gender composition.

Table 1. Teamwork Individual Item averages

Items	Self Rating	Team Rating
Contribution	3.25	3.10
Engagement	3.13	3.00
Preparation	3.11	3.02
Resolve Conflict	3.03	2.97
Positive Climate	2.94	2.80

Note. Team rating is the average of other two team members

Table 2. Correlation between expertise rating and gender

Participant Gender	Team Member One Gender		Team Member Two Gender	
	r	p	r	p
Males	-.04	.31	.01	.92
Females	.00	.97	.05	.59

No difference in Likert scale rating based on gender
This individual has the expertise to make high quality contributions to the team.

~ 82% of the sample rated their members 'Agree' or 'Strongly Agree'

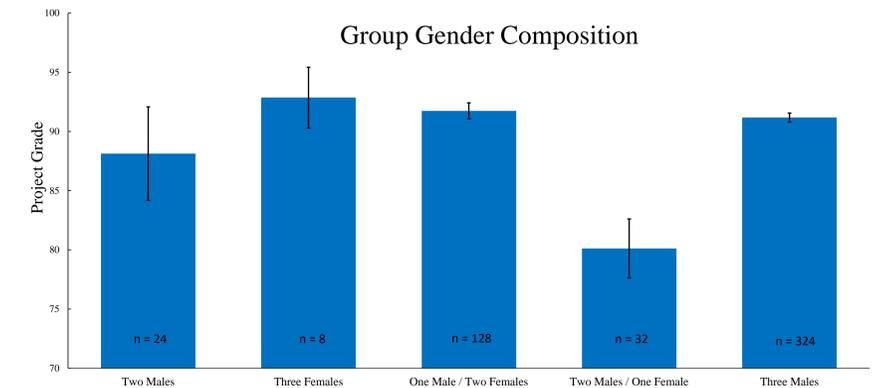


Figure 1. Average project grade based on group composition. Groups made up of two males and one female performed significantly worse on their project than all other groups.**

Discussion

Assessing teamwork is difficult. The scores on the VALUE rubrics align with number of years in college, a proficiency of 1 corresponds to the expertise expected of a freshman, a 4 to the expectations for a senior or graduate.

Determining the successful interaction of team members is not the same as evaluating the success of the product or task performed by the team.^{[5],[6]} This data shows a direct relationship between the product and the process in considering teamwork.

More women are earning degrees in STEM fields, yet one study found that men tended to undervalue the expertise of women, regardless of educational attributes.^[7] This trend was not observed here. Possibly the academic setting is different than the professional setting.

Engineering is still a predominantly male field and this course is generally 17% to 20% female. In forming teams of three, the professors should consider this fact and try to place females on teams together.

Conclusions

It is not surprising that students evaluate their teamwork skills on the high end of the scale, since they understand that these skills will be valuable to them in their job hunt. Therefore the validity of this type of assessment as a measure of actual teamwork skills is unclear. The same survey has been given this spring and the data will be evaluated and compared in an effort to assess the best way to determine development of teamwork skills.

The correlation between gender of the evaluator and gender of the one being evaluated will continue to be investigated, even though no correlation is observed in the current data. Lastly, it will be suggested that, in future semesters, teams with two males and one female should be avoided.

*Survey data compiled and analyzed for statistical significance, tables and figure created by Cory Newell, MS.

**Bonferroni correction for multiple comparisons was used to minimize type one error. Error bars represent standard error of the mean.

References

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