Observations on Forming Teams and Assessing Teamwork

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Introduction

There are two, well-known, conventional wisdoms regarding team formation. One is that teams should be assigned rather than self selected. Another is that white males dominate all team functions; therefore, women and minorities should not be in the numerical minority on any team.

In the Chemical Engineering Department at West Virginia University, students have been doing design projects in teams of 3 or 4 each semester in the sophomore and junior years for 15 years. Seniors have been working on a large group project under the direction of a student chief engineer for over 60 years.[1] In the senior, unit operations laboratory, students work in pairs. This paper presents unscientific observations and anecdotes from many years of experience with team formation and functioning. Methods for assessing teamwork will also be discussed.

Observations on Team Formation

Three methods have been used to form teams. At times, teams have been formed by student self-selection. At times, they have been assigned by the instructors. And, more recently, students have been permitted to choose a partner, and the pairs were paired by the instructors.

In the unit operations laboratory, pairs are assigned by the instructor. Given our small class sizes, by the time students become seniors, they know everyone in the class very well. There have been few, if any, problems associated with this method of assigning pairs in this class.

In the sophomore and junior design projects, all methods mentioned above have been used to form teams. Student self-selection has been found to have advantages and disadvantages. Among the advantages is that students who live together can work together. They are able to work with the people with whom they are used working. Since they will have opportunities to work with other peers, such as in lab, this is not seen as a limiting situation for our students. The disadvantage observed with self-selection of teams is that there is almost always one "orphan" team, composed of students who do not have many friends in the class. These "orphans" can be non-traditional students, many with families, students who have returned to school after being out of school for a time, or students who are forced to repeat classes due to academic problems. These teams often lack a leader and wander without direction until close to the project due date. Another problem that has been observed with "orphan" teams is that a combination of non-traditional students and traditional students often results in problems associated with scheduling of times for team meetings. Non-traditional students, especially those with families, prefer to work during "normal" hours. Traditional students, particularly those that are "orphans," often prefer to work during what can best be described as unusual hours. Naturally, this creates friction on the team, which often manifests itself in a poor project.

Assignment of teams by the instructor is simple, but students do not seem to like it. Making the argument to them that this is the way it will most likely be done in the work place has little effect. They do not care; they want to work with their friends. So, while this may be a sound pedagogical method for selecting teams, the resulting student dissatisfaction is often manifested on the end-of-semester student evaluation forms.

A method that we have used, with reasonable success, is letting students pick a partner, and then forming teams of four by paring pairs. It is important to have a good count of students before doing this, because, for example, in a class of 26 students, 13 pairs are not possible, two single students are needed. The advantage of this method is that students get to work with at least one person of their choosing. A disadvantage is that, quite often, top students choose to work together. If they are paired with weak students, they often do most of the work rather than teach the weaker students.

Here is an interesting anecdote. In the spring 2002 semester, instructors assigned teams, mostly out of a desire to split up the two top students in the class. In the method of pairing pairs, they had always chosen to work together. They were initially unhappy; however, they each assumed leadership of their respective new teams and the results were two good design projects. An interesting result involved the feedback from other teams. Several teams of four that had worked together quite successfully in previous semesters, based on the quality of the final design and team member evaluations, were assigned to the same team, under the apparently faulty logic of "if it is not broke, don't fix it." It seems that some of the team members were beginning to get on each other's nerves, and they would have preferred to have been placed on a different team. The lesson of this anecdote may be that teamwork formation is a no-win situation for the instructor.

Then, there is the issue of women and minorities. After hearing a paper that stated that women and minorities should not be in the numerical minority on a team, this author dutifully paired the only two minority students in the class. (Our minority population is usually very small. Most of the time, there are none, and there is often only one.) One was a good student who eventually went to graduate school. The other was a weak student who never completed the program. The observation was that the weak student dragged on the team more than the good student could push it forward. However, it is true that the other two members of this team turned out to be weaker students than anticipated by their grade-point averages. Several years later, there was only one minority student in a class, and no problem was observed. It is important to understand that this student came from a middle-class background (his father is an engineer), and he was an excellent student (who is completing medical school this academic year). We have other, similar anecdotes for women. Some women can lead a group of all men. However, women being unnecessarily deferential to men has also been observed, even when the woman was the best student in the group. Therefore, the unscientific conclusion from our years of experience with teamwork selection is that the individuals matter more than their minority status.

Assessing Teamwork

Three methods have been used to assess teamwork. One is direct observation by instructors, which is possible given our enrollments. This is the source of the anecdotes cited above.

Another is a published survey of team members.[2] For this survey, team members are given substantially the same survey (with only the verb tense changed) three times, at the beginning of the project, midway through the project, and after completion of the project. Results have been interestingly consistent. Scores are high at the beginning of the project. They are lowest at the midpoint of the project. And, they recover about one-half of the decrease at the end of the project. It is unclear what is learned from this survey.

A team member evaluation form is also available in the literature.[3] In our version, team members rate themselves and all teammates on a 100 point scale having discrete, ten-point intervals. A person's average is divided by the average of all scores (16, on a four-person team). The theory is that this number should be the factor by which the team score is multiplied to get the individual's score. We have never actually done that, because, when there have been problems on a team, the result would have been a score greater than 100 for the best performers. It has also been observed that many students are not very discriminating in evaluation of their peers. Quite often, all peer scores are identical, often with a score of 100. What has been done is to look carefully at any team with individuals having multiplicative factors greater than 1.1 and less than 0.9. After meetings the individuals involved and the team as a whole, modifications to the grade for the project were assigned.

Conclusion

In conclusion, anecdotal information has been presented comparing different team formation methods. Anecdotal evidence suggests that the conventional wisdom may have flaws. However, it is also possible that there is no method for team formation that works for everyone all of the time. Finally, some methods for assessing teamwork were discussed. It is unclear what is learned from these assessments.

Bibliography

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