

# Web Based Collaboration in Teaching Teamwork

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## ABSTRACT

Teamwork is recognized as an important skill for engineering and computer science students. Industry strongly advocates inclusion of teamwork in the curriculum and teamwork is a requirement for ABET accreditation. Unfortunately most engineering and computer science programs fail to address teamwork as something that needs to be taught. It is usually expected that students should learn teamwork skills on their own, through participation in various team projects. Little thought or effort is given as to how to improve the way teaching is done in order to improve students' abilities to function on teams. One reason for this is that teaching teamwork demands a good deal of time and effort from the faculty. This is especially the case when teamwork is incorporated in regular lecture-discussion classes, rather than classes dealing with capstone projects. The result is that students often do not learn the critical teamwork skills such as: communication, planning and tracking, collaborative design, and peer reviews. We have developed an approach for teaching effective teamwork skills utilizing Yahoo Groups along with a Learning Management System (LMS), such as Moodle. Our approach improves student learning of teamwork skills by assuring that effective communication and team collaboration develops among all team members. Instructors are able to teach teamwork skills without having to devote a great deal of extra time and effort. Experience with this approach has shown more sustained participation by all team members in performing the collaborative work and greatly improved team communications.

**Keywords:** Agile Processes, Assessment, Collaboration, Communication, Teamwork

## 1. INTRODUCTION

Increasingly, teamwork skills are seen as vital for today's engineers. Michelle Shearer, National teacher of the year, recently addressed high school students attending a STEM (Science, Technology, Engineering and Math) seminar and identified what she called the four C's that are essential in STEM careers – critical thinking, creative problem solving, communication and collaboration. This view she feels “shatter[s] the image of what students think a traditional scientist or engineer looks like” [1]. Notice that two of the four C's cover communication and collaboration. As much as we tend to believe the importance of these last two C's, we do little to actually teach our students these skills. Ten years ago, Berry and Lingard reported that although “many programs today make team projects fundamental elements of their curricula, few actually teach teamwork and communication skills directly” [2]. As Purzer has more recently said, “Despite the importance of

gaining effective teaming skills for our students and the increased popularity of using collaborative learning methods in college classrooms, there are limited modules and instructional tools designed to teach teaming skills to engineering students” [3]. The focus of our work is on developing effective techniques by which students can learn and improve teamwork skills and additionally provide the means by which instructors can evaluate and assess the degree to which individuals are learning these skills.

## 2. BACKGROUND

Previous efforts in attempting to assess student learning of teamwork skills using peer evaluations have provided some insight regarding which teamwork skills seem to be most difficult to learn [4]. After identifying a long list of important teamwork skills, the ones in which students rated their fellow teammates the poorest included the ability to clearly communicate with other team members and the abilities to both ask for help and to give help when needed. These are precisely the communication and collaboration skills deemed essential for today's engineers and scientists and are the skills targeted by our approach.

Two of the main challenges in teaching teamwork are dealing with negative student perceptions about teamwork and addressing the workload issues of faculty. Students have been conditioned to work independently and often view team assignments as extra work in which some students do little and yet receive credit based on the efforts of others. Often the advantages of teamwork are overshadowed by these negative aspects. Studies have shown that poor experiences on teams reinforces students' perceptions that teams are more trouble than they are worth [5].

The other challenge is that faculty view teaching teamwork as additional work, and furthermore, many feel unqualified to teach or evaluate teamwork skills. Many instructors have never worked in a team environment, and teaching teamwork skills does not come naturally. Certainly, training faculty can help to improve the teaching and evaluation of collaboration skills, but one goal of our approach is to make it easier for faculty to provide meaningful teamwork assignments and to facilitate the evaluation of both team and individual achievement.

## 3. APPROACH

We have developed an approach for teaching effective teamwork skills utilizing web collaboration. Within an agile framework [6] and using tools like Yahoo Groups we can help students to experience a successful teamwork activity. This

approach can be used to help students and faculty achieve the following goals:

- Engage all students in the development of a well defined and significant problem that is understood by all
- Help form cohesive teams
- Ensure development of appropriate plans and schedules
- Maintain effective communication among all team members
- Ensure that all team members are engaged in performing technical work and in the team decision making process, including issues related to quality control and configuration management
- Engage students in tracking execution of project activities with respect to the plans
- Optimize learning of teamwork skills by focusing on technical work products and peer reviews rather than production of formal documents and presentations
- Promote fair and accurate grading of individual students reflecting level of participation and the quality of the work products produced
- Avoid excessive workload for faculty in managing and grading the team projects

This approach improves student learning of teamwork skills by assuring that effective communication and team collaboration develops among all team members. Our approach leverages on using an Agile development process that encourages formation of self-organizing teams and effective team communication [7]. Most of the team interactions occur asynchronously, using web based tools such as Yahoo Groups, with short face-to-face meetings taking place once a week. The features available in web based collaboration tools like Yahoo Groups allow both the mentoring and monitoring of project teams. Faculty can easily assess the levels of participation by the individual members and also gauge team progress as the project develops. Our approach

enables faculty to teach teamwork skills without demanding a great deal of extra time and effort.

#### 4. CONCLUSIONS

We have applied this approach in teaching teamwork in a number of non-capstone classes. We have achieved good results, as evidenced by sustained participation by all team members in collaborative work and development of good team communications. Our presentation will describe this approach in greater detail and share the results we have obtained to date.

#### 5. REFERENCES

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