

Structuring a Project Management Course to Develop Team Skills

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Abstract

There's no escaping it. Working in industry requires working in teams. The industries hiring our graduates recognize this. TAC of ABET Criterion 2e requires it, stating graduates need "an ability to function effectively on teams." How do we, as teachers, go about ensuring that our students learn how to work effectively on teams? How do we go about teaching them team work and team management skills?

The traditional approach to developing team work and team management skills involves assigning students randomly to teams, giving them a project to work on, and expecting them to somehow magically learn to work effectively on teams. This 'they'll learn about teamwork if they work on teams' approach fails to give students adequate preparation and insight into team work and team management skills. It doesn't work. Surveys of students reveal that they do not feel they knew how to effectively work on teams or how to be a team leader. This sentiment was echoed by respondents to last year's project management survey. To effectively prepare students to work on teams, coordinated teambuilding and leadership skills training is needed. Beginning with a discussion of necessary project management and team skills, this paper will describe how to structure a project course to include techniques and exercises specifically designed to develop teamwork and team management skills and the benefits they provide.

Project Management Skills Taught

The Project Management course is required for all Engineering Technology majors. The course is normally taken in either the Sophomore or Junior year and students are expected to use these Project Management skills to manage projects in subsequent courses.

The skills taught in the project management course are described by the course outcomes which state that upon successful completion of the course students should know the specific characteristics, techniques, and insights that are necessary to be an effective project manager:

- Know how to write a project proposal.
- Know how to prepare a project plan.

- Know how to prepare a project schedule
- Know how to establish a project budget.
- Know what it takes to be an effective team leader and/or member.
- Be able to solve PERT/CPM network problems and determine the critical path, early start, late start, slack times, etc., using Microsoft Project software.
- Be able to make oral presentations about their proposals, plans, and project activities.

Various methods are used to assess how well students are able to achieve the course outcomes, including:

- Projects (either with industry or a simulated project)
- Written technical reports (proposals, plans, budgets)
- Oral Presentations (proposals, plans, project update summaries)
- Homework
- Quizzes/exams

Team Management Skills

Henry Ford, founder of Ford Motor Company, once said:

Coming together is the beginning. Keeping together is progress. Working together is success.

A wide variety of skills are needed to work together effectively. Four, in particular, stand out: understanding others, negotiating, time management, and conducting effective meetings. These four skills, as identified by the people who hire our graduates, need to be taught in such a way as to help the student internalize the information for later use. In order to structure techniques and exercises within the context of a course, it is important to understand these skills.

Understanding people

Teams are composed of individuals and their individual personalities will affect team performance. Team leaders and members need to recognize each individual's knowledge and skill base so that the individuals can be assigned tasks that utilize these skills effectively. Another key to helping teams function more effectively is knowledge of team members' personalities.

Many people are familiar with the concept of left-brain versus right brain functions. Typically, left-brain-dominant individuals are more analytical and logical. Right-brain-dominant people are more emotionally and visually oriented. A left-brained team member may focus on categorizing activities, analyzing processes, and estimating costs or times. They like to arrange and coordinate schedules. Right-brained team

members are good at evaluating customer needs and assessing other team members' attitudes and feelings. They like to visualize the entire system.

Sometimes the left/right brain concept doesn't provide enough latitude when understanding people's personalities. Ned Herrmann's Four-Quadrant Personalities, presents four personality types: Analytical, Leader, Planner, and Communicator. Analytical types focus on 'what?', as in 'what are the facts here? What are the expectations? What needs to be done? Leaders focus on 'why?' asking 'why can't we do this?' What does this need to happen? Planner types focus on getting things done. They want to answer the question 'how?', as in 'how are we going to get the work done? The Communicators try to answer the question 'who?' as in 'who are the people affected by this project, decision, or problem?'

When team members understand that different personality types will approach the same problem in different ways, they can work together more effectively in a team. Teaching students about these personality types can help them become better team members. Teams comprised of many different personality types are better able to grasp the entire problem or project.

Negotiating

Students need to be aware that negotiations occur in all sorts of different situations from customer issues to internal debates. Negotiating is tough because there are two sides, each with their own interests, objectives, and agendas. On the surface, negotiating is straightforward:

- Present the facts
- Discuss the facts
- Discuss the viewpoints on the facts
- Reach a rational agreement.

Negotiating is straightforward, but it isn't easy. Student skill development involves helping them understand that preparation for a negotiation significantly influences the outcome of that negotiation. Adequate preparation enables negotiations to move more quickly to a positive conclusion by preventing surprises. Information related to the negotiation can be more clearly evaluated and aligned with long term goals during advance preparation. Skilled negotiators recognize that in any negotiation it is important to:

- Set clear objectives
- Listen well
- Take time
- Be flexible
- Be well prepared
- Be factual.

Skilled negotiators build a reputation for being fair but firm. They create an atmosphere of trust and confidence, not doubt and suspicion.

Time management

One of the major problems with time management is getting people to understand that time can be managed! Students need to develop time management skills in order to successfully conduct business in the future. Students need to learn how to recognize time robbers like a lack of information, impromptu tasks, unscheduled activities, procrastination, poor communication, and lack of sufficient planning. Instead, they need practice in effective time management techniques: delegation, scheduling, decision making, planning, agenda setting, communicating, and prioritizing. Good time managers make a point of:

- Establishing priorities
- Establishing opportunity costs on activities
- Scheduling
- Planning blocks of time for important things
- Delegating
- Communicating clearly

Time management skills can be taught to students through appropriate in-class activities, including follow-up throughout the semester to help them stay on track and on target.

Conducting effective meetings

Without good leadership, a meeting can become an unproductive waste of time. Poorly run meetings nearly always exhibit the same problems: no specific or clearly defined objective(s) for the meeting or the participants; no meeting agenda; unprepared leaders or participants; and the wrong choice of participants.

Care should be taken to teach students how to prepare for an effective meeting. An effective meeting will incorporate several principles:

1. Determine the objective of the meeting
 - Why is the meeting going to be held?
2. Determine who should participate
 - Who can influence the fulfillment of the meeting objective?
3. Set an agenda
 - What is the plan of action for the meeting?
4. Prepare for the meeting
 - What is needed in order to provide answers and save time?
5. Run the meetings
 - How will the agenda be used to keep the meeting on track?
6. Make decisions
 - How will the issues be dealt with?
7. Assign responsibilities
 - Who will be responsible for achieving results?

8. Follow-up

Did we do what we said we would do?

Team members trained in how to conduct meetings can use their time more effectively. They will be much more effective at meeting their work goals and objectives. Students need to understand that preparation like this will make the meeting work for, rather than against the participants. They also need to understand that having an agenda and following it are key aspects of having successful meetings. A good agenda will state:

- The objective of the meeting
- The issues that will be discussed
- The beginning and ending times of the meeting
- The location
- The participants
- The preparation expected of the participant.

Students need to understand that with preparation and an agenda, meetings are easier to keep on track. Meetings are successful only when they bring about results.

So, if these are the skills required, how are these skills taught in a classroom environment?

Techniques and Exercises

Understanding People

To help prepare students for working on teams, each team is given an assignment to use Ned Herrmann's Four-Quadrant Personalities to help them recognize the different personalities and behaviors of their team members as well as their own. The goal of this exercise is for students to understand not only the different personality types they will have to work with, but also how teams benefit from having members with diverse personalities. In the exercise, students individually develop questions before class designed to help them identify the four different personality types. In class, as a team, the students ask the questions of team members. They use the answers to write a paper on the personalities of the other people on the team. At the end of the exercise, they exchange their papers and discuss their findings. Figure 1 is an example of an assignment on the Four-Quadrant Personalities.

Negotiating

Team leaders as well as team members must develop good negotiating skills to be able to effectively interact with others. Teams are given the opportunity to develop negotiating skills through role playing exercises. Small teams are formed and each team selects a case study or recent newsworthy business disputes to role play. The students adopt the roles of individuals in the case or situation and prepare negotiation to be played

out in class. Each case is negotiated to reach a conclusion. At the end of the exercise, each team prepares a short paper documenting the results of the negotiation. A part of the grade is determined based on their classmates' evaluation of the team members negotiating skills as well as the results of the negotiations. Figure 2 is an example assignment on negotiating skills.

Time Management

Students are given an exercise to get them started thinking about time management and how to better manage their time so as to ensure that they are focusing on the things that are more important. They are asked to keep a diary of daily activities for one week that details how they used their time. At the end of the week, they analyze the activities to determine how much time is spent on important activities versus unimportant or time wasting activities. They also comment on their ability to have completed the important activities to their satisfaction. They do this by rating each activity according to some scale, such as very important - must be done; important - should be done; and unimportant, other scales, such as the familiar A, B, and C scale. After rating the activities, students use the information to determine how they used their time. Activities related to their team responsibilities must be among the higher priorities. They are asked to write a short paper that details how they plan to use the time management concepts of establishing priorities, establishing opportunity costs on activities, scheduling, planning blocks of time for important things, delegating, and communicating clearly in being a more effective team leader and team member. Throughout the semester, they are asked to maintain a schedule.

Conducting Effective Meetings

As previously stated, without good leadership, meetings can become an unproductive waste of time. Project teams are asked to consider the principles listed above for effective meetings and then as a team discuss how they will use those principles to keep their meetings on track. Additionally, the teams discuss how they can supplement their face-to-face meetings with electronic meetings using computer technology such as email, threaded discussions, chat rooms, Quickplace, etc. Each team presents to the entire class, the results of their discussion of these principles and how they plan to use them to conduct effective meetings. Time in class is taken to discuss similarities in approaches or new ideas. This helps all student teams enhance their performance.

Team Contract

Each team must develop a contract; an agreement among the team members about how the team will operate. Some of the things that must be in the team contract include: when will team meetings be held, meeting attendance requirements, how will meetings be conducted and, performance and quality of work requirements for each team member. A

team contract is important to establish the norms of behavior expected by the team members early in the project and helps to reduce misunderstandings during the performance stage.

Peer Evaluations

It is important for the instructor to receive feedback on how well each student performed as a team member. Some students become “social loafers” who try to let other team members do all the work. Each student is asked to evaluate their contribution as well as each team member’s contribution to the project. This is done several times during the semester and the feedback is used, in part, in determining individual grades.

Student Evaluations

A Professional Skills survey is administered to all Engineering Technology Seniors each semester. The instrument surveys student opinions about their skills in the areas of teamwork and management, leadership, communications, ethics and diversity, and service and lifelong learning. Students answer survey questions that rate their skills on a scale of 1 (strongly disagree) to 5 (strongly agree). The questions pertaining to teamwork are: “I am prepared to participate effectively on multidisciplinary teams” and “I understand team dynamics and the value of working on team projects.” Teamwork and management skills were rated an average of 4.3 in the Fall 2003 semester and 4.4 in the Winter 2004 semester.

Conclusion

Teamwork, which involves shared leadership, group decision making, and consensus, requires time and experience to develop the skills to be effective. It requires student teams to develop openness and trust among the team members. We are not naive enough to believe that upon completing this course that students will have mastered the teamwork skills that they will need to be effective team members in industry. We do expect that the principles taught and experiential exercises that they have experienced in this course and reinforced in other courses will give them a foundation that they can build on to help them develop their skills and become effective team members over time.

References

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Biography

CHARLIE P. EDMONSON is an Associate Professor and Program Coordinator of Industrial Engineering Technology at the University of Dayton. Prior to joining the faculty at UD, he retired from the U. S. Air Force after 30 years of engineering design, industrial engineering, and experience at various levels of management.

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Four Quadrant Personalities Exercise

(25 points)

Teams are composed of individuals and their individual personalities will affect team performance. Team leaders and members need to recognize each individual's knowledge and skill base so that the individuals can be assigned tasks that utilize these skills effectively. A key to helping teams function more effectively is knowledge of team members' personalities. It is also important to recognize your own personality so that you, too, can work more effectively in a team.

Goal:

To understand the different personality types you will have to work with and also to understand your own personality type.

Preparation:

In preparation for the exercise:

1. Study the four different personality types as presented in class.
2. Describe your personality type, citing examples of why you feel you are that type. (hand in)
3. Individually develop a list of questions to be used during class to help you identify the personalities of other people you talk with. (hand in)

In class:

Form teams randomly. (5 minutes)

Using your question list, ask the questions of your team members. As you listen to the answers, jot down information that will help you identify each team members personality. (20 minutes)

At the end of the discussion time, on a separate piece of paper for each team member, write a short paper on the personalities for each of the other people on the team. (15 minutes)

Exchange your papers and discuss your findings. (15 minutes)

Figure 1

Contract Negotiation

(50 points)

Negotiations, large and small, take place on a daily basis in industry. Good negotiating skills are critical for successfully interacting with others. The following scenarios were developed to enable you to apply the negotiating skills discussed in class. The topics of these scenarios can be related to a variety of chapters in the text.

Goal:

Your goal during this simulation is to play your assigned role and reach an agreement with the opposing side. Strive to reach an agreement, but remember you are responsible for protecting the goals of your constituents. Attempt to reach an agreement that is positive for your side. Giving in to the other side without making an effort will result in a lower grade.

Please form a team (see team requirements for each case) and select a case. Adopt the roles of the individuals in the case and prepare an in-class negotiation. On the dates listed, each case will be negotiated in class for 20 minutes in order to reach a conclusion. At the end of the exercise, each group will be responsible for a short paper documenting the results.

Grading:

Familiarity with the topic (research into background information from the chapters/course/other sources)	20 points
Preparation for the negotiation (as shown by your participation and performance during the negotiation)	20 points
Result of the negotiation (as shown by the concluding terms of the negotiation and the votes of your classmates)	10 points

Examples:

Case I. Downsizing the Organization

Key issue: Downsizing: is it the right thing to do? How should it be done?

2 White Collar Employee Representatives

2 Company Executives

Case II. Airlines in Bankruptcy

Key issue: Contract negotiation: Should work flexibility be granted to management in the areas of scheduling, crew formation, and crew size.

2 management representatives

2 machinists or pilots or flight attendants union representatives

Figure 2