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AUTHOR Van Slyke, Craig; Trimmer, Kenneth; Kittner, Marcy
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ABSTRACT

Teams are becoming increasingly important as an organizational form, particularly in information systems (IS) development. In response to this trend, a number of educators, including IS educators, include team components as part of their course curriculum. For example, many systems analysis and design courses include a team project component. It may not be enough, however, to simply have a team project. It may be necessary to integrate instruction in teamwork skills into IS courses. This paper discusses the importance of teams and delineates the knowledge, skills and abilities (KSAs) necessary for effective teamwork. In addition, the paper provides an example of how instruction in these KSAs can be integrated into IS courses. Finally, it presents the early findings of a research program which examines the effectiveness of the proposed approach. A handout on effective self-managed teams is appended. (Author/AEF)

INTEGRATING TEAMWORK INTO INFORMATION SYSTEMS COURSES

Craig Van Slyke
University of South Florida

Kenneth Trimmer
University of South Florida

Marcy Kittner
The University of Tampa

Teams are becoming increasingly important as an organizational form, particularly in information systems development. In response to this trend, a number of educators, including IS educators, include team components as part of their course curriculum. For example, many systems analysis and design courses include a team project component. It may not be enough, however, to simply have a team project. It may be necessary to integrate instruction in teamwork skills into IS courses.

This paper discusses the importance of teams and delinates the knowledge, skills and abilities (KSA's) necessary for effective teamwork. In addition, the paper provides an example of how instruction in these KSA's can be integrated into IS courses. Finally, the paper presents the early findings of a research program which examines the effectiveness of the proposed aproach.

INTRODUCTION

The organizational form of teams is becoming increasingly important to organizations (Fulk and DeSanctis, 1995). As a result, employers desire employees who are skilled in teamwork. The information systems (IS) field is not immune from this emphasis on teams and teamwork. The team is a popular organizational form for IS development (Abdel-Hamid & Madnick, 1991, Ford & McLaughlin, 1992, Phan, et al., 1995). Due to this interest in teams, IS educators need to teach their students how to effectively work in teams.

This paper has three purposes. One, it discusses the importance of teams and teamwork both to organizations in general and to IS in particular and also delineates the knowledge, skills and abilities (KSA) required for teamwork. Two, the paper argues that teaching these KSA's in the context of IS courses provides the best opportunity for IS students to gain these KSA's and presents one method for integrating teamwork training into IS courses. Three, the paper presents current research into the effectiveness of our approach to teamwork training.

The paper is organized as follows. First, the importance of teams is discussed. Next, we examine what KSA's are necessary for effective teamwork. Then, the question of where teaching teamwork fits into the curriculum is examined. This is followed by an example of how the explicit teaching of teamwork is being integrated into the IS classroom. Next is a field experiment designed to test the effectiveness of the approach described, including results from the control phase of the study. Finally, conclusions are drawn.

THE IMPORTANCE OF TEAMS

As society enters the third century of the industrial revolution organizations are re-evaluating how they perform their core functions (Hammer & Champy, 1993). As such, some organizations have collapsed their management hierarchy by restructuring or downsizing (Kettinger & Grover, 1995). One response to these organizational activities has been to replace some of the existing hierarchical management structure with self-managed work teams (Whitfield,et al. 1995). Teams offer an opportunity to bring together individuals with the abilities necessary to complete a va
r
iety of projects -- both short and long term. Developments such as new technologies and the globalization of competition make teamwork increasingly important (Salas, et al., 1992). As tasks become increasingly complex, accomplishing these tasks imposes demands, both physical and mental, that are simply too complex for a single individual to perform in isolation.

Teams also provide the same social function that the organization does in that they allow individuals to accomplish more than they can by themselves. As one group of researchers asserts, "teams form to tackle goals beyond the reach of individual members" (Brannick, Roach and Salas,1993, p.287). Goals and tasks which exceed the knowledge, skills and abilities of any given individual, no matter how competent, are likely to occur with increasing frequency given the incredible growth of technology and technical knowledge (Larson & LaFasto,1989). A collection of individuals working interdependently toward a common goal may be well suited to complete especially difficult tasks with higher quality than individuals working separately. The complexity of a problem invariably increases with the importance of the problem to the whole organization, society, or country (Larson and LaFasto, 1989). This implies that the most important decisions are better made by a team than by an individual as individuals will have a difficult time being mindful of all important considerations and implications.

Teams have the potential to bring together several different viewpoints, all of which may make important contributions to critical decisions. This is, of course, dependent upon the selection process. Teams selected for homogeneity of members may have radically different outcomes than teams selected for heterogeneity of members. Janis (1982) has suggested that heterogeneity of viewpoints, among a number of other factors, may contribute to higher quality in decision-making (at least in consensus formation). It has been proposed that the most important innovations and ideas are no longer within the realm of the individual--they now require a team (Larson and LaFasto,1989). In fact, each individual member of the team must contribute some unique and relevant ability and knowledge to the task (Tziner & Eden,1984). Through compensation, a team functioning well may attain high levels of productivity. Smith, Salas & Brannick (1994,p.3) put it best with this: "One of the key advantages of a team is that team members can compensate for one another's strengths and weaknesses by catching errors and correcting mistakes during decision making." This further emphasizes the advantage of divergent backgrounds and opinions.

A final advantage may be realized in worker attitudes and beliefs. Studies of autonomous and semi-autonomous work groups have indicated that they may increase both productivity and job satisfaction (Carnall,1982; Rao, Thornberry & Weintraub,1987). The literature on teams holds similar conclusions (Gladstein,1984; Hackman, 1987). Sociotechnical theorists suggest that team membership may serve to increase workers' dignity, self-worth, commitment, and sense of purpose and reduce alienation (Carnall,1982; Rao et al.,1987). In most organizations, this will be a secondary consideration at best. However, an intervention that will bring benefits to both the organization and the individual seems superior to any offering benefits to one or the other.

Not only have teams become more important to organizations in general (Gordon, 1992), but teams are also widely used in the IS world. Teams are related to IS in at least two ways. First, information systems must support teams (Barua, et al., 1995). While this is an important topic, it is not considered in this research. More important to this paper is the fact that teams are widely used as an organizational form for IS development (Abdel-Hamid & Madnick, 1991; Ford & McLaughlin, 1992; Phan, et al., 1995).

Employers translate the importance of teams into a desire for certain skills in employees. In a survey of recruiters of recent IS graduates, teamwork related skills were among those rated as being most important (Van Slyke, Kittner & Cheney, 1997). A recent issue of ComputerWorld's Student Issue publication includes an article specifically discussing the importance of teamwork and communication skills (ComputerWorld Careers Edition, 1997).

IS educators must prepare their students for the increasing popularity of teamwork. The IS\'95 Curriculum Guideline notes that graduates should have the ability to lead and facilitate teams (Cougar, et al., 1995). Other researchers have also noted the importance of integrating teamwork instruction into IS and business education (Alavi, et al., 1995; Feller, 1996)

The importance of providing IS students with the knowledge necessary to function effectively in teams is well established. However, little research has been performed concerning how to accomplish this. Fellers (1995) provides an exception and gives advice on how to implement teams as part of a cooperative learning environment. However, Fellers does not include the explicit teaching of teamwork KSA's among his recommendations. This paper provides a specific method for teaching these KSA's and for integrating this teaching into IS courses.

If IS educators are to provide instruction into effective teamwork, we must understand what knowledge, skills and abilities must be gained by our students in order to make them effective team members. The next section discusses this issue.

REQUIRED KNOWLEDGE, SKILLS AND ABILITIES FOR EFFECTIVE TEAMWORK

Stevens & Campion (1994) provide a thorough treatment of the KSA requirements for teamwork. The brief discussion here is drawn from their work, except where noted otherwise. Readers interested in more detail on this topic are directed to the original article.

The KSA requirements for teamwork can be broken down into two broad categories--interpersonal KSA's and self-management KSA's. Interpersonal KSA's include KSA's for 1) conflict resolution, 2) collaborative problem solving, and 3) communication. Self-management KSA's include 1) goal setting and performance management, and 2) planning and task coordination (Stevens & Campion, 1994). Each of these is discussed in more detail below.

Interpersonal KSA's

Conflict resolution: One of the advantages of working in a team is that the team can make better decisions than can the individual. In order for this to occur, a certain amount of conflict is desirable--disagreement leads to a variety of decision solutions being identified and considered (Brockman, 1996). In order to work as an effective team, members must posses the KSA's necessary to recognize both desirable and undesirable conflict and to encourage the desirable and discourage the undesirable. In addition, the team must have the KSA's to be able to identify the source, as well as the type, of conflict the team is facing. The KSA's to execute an appropriate resolution strategy is also required. Finally, the team must be able to effectively use a win-win, rather than a win-lose, negotiation strategy.

Collaborative problem solving: The team must gain the KSA's to be able to identify situations that are appropriate for group problem solving. It is also important to be able to use the right type and degree of participation. Additionally, the KSA's to recognize barriers to collaborative problem solving and to take the proper actions to overcome those barriers are necessary.

Communication: Several communication KSA's are required for effective teamwork. These include the KSA's to:

1) understand communication networks,
2) communicate in an open and supportive manner,
3) listen actively and nonevaluatively,
4) maximize the agreement between verbal and nonverbal messages,
5) interpret other's nonverbal messages, and
6) recognize the importance of and engage in small talk and ritual greetings.

Self-Management KSA's

Goal setting and performance management: Teams must posses the KSA's to enable establishing specific, challenging and acceptable team goals. They must also gain the KSA's to engage in effective performance monitoring, evaluation and feedback, both in terms of the individual member and of the team as a whole.

Planning and task coordination: If they are to be effective, teams must gain the KSA's to be able to coordinate activities and information. In addition, they must recognize task interdependencies. Teams must also have the KSA's properly balance the workload of various members and to set role and task expectations.

The KSA's discussed above were used in establishing course material including lectures and handouts used in teaching teamwork.

TEAMWORK TRAINING IN THE CURRICULUM

As noted earlier, the importance of training in teamwork skills is important, and in the last section we delineated the knowledge, skills and abilities necessary for effective teamwork. The final issue to be considered , which is addressed in this section, is how to integrate the teaching of teamwork into the curriculum.

Although many courses in the IS and business curriculum may use team projects as an integral part of their makeup, it seems that there is little time allotted to teaching the necessary skills. In informal conversations with other IS educators at a number of institutions, the authors came to believe that most instructors, while agreeing with the importance of teamwork skills, have not yet integrated explicit training on teamwork skills into their courses.

Where, then, can students learn how to be effective members of a team? In colleges of business, a number of courses employ team-based projects, therefore students do get exposure to working in teams. The situation is the same in many IS departments. Team projects are frequently an integral part of courses such as Systems Analysis and Design and Database. These projects certainly give experience in teamwork that is both valuable and necessary. However, in order to make these experiences richer, training in teamwork skills is necessary. Anecdotal evidence indicates that many students do not enjoy team projects. Most educators who employ these projects have heard many complaints about team conflicts, unproductive members and the like. Perhaps training in teamwork can teach students how to deal with teamwork in a positive, rewarding fashion. In the next section, we describe one method for explicitly teaching teamwork training skills in the IS classroom.

A METHOD FOR TEACHING TEAMWORK SKILLS

The proposed method for teaching teamwork skills in the context of IS courses includes five components:

1) class lecture and discussion sessions,
2) a teamwork handout
3) in-class collaborative exercises,
4) a team-based project, and
5) monitoring of the teams by the instructor.

These components are designed to be interrelated--all components work together to move the students toward acquiring the required KSA\'s discussed earlier. This section details the components.

Lecture and Discussion Sessions

The first lecture and discussion session on teamwork should take place early in the term. The goal of this session is to:

1) make the students aware of the importance of team-related skills,
2) get the students thinking in terms of teams and teamwork, and
3) introduce the critical KSA's necessary for successful teamwork.

The basic structure of the session follows the teamwork handout (described below), which is given to the students at this time. Throughout the session discussion is encouraged by asking the students to relate the various topics to their own experiences. The session begins by stressing the importance of team-related skills. This is followed by a discussion on the nature of teams and team-based activities. Then, team and project organization is presented using the context of the team project. The session concludes with a discussion of a number of hints that can help the teamwork experiences. Although only one class session is devoted to teamwork, periodically throughout the term teamwork issues will be revisited and discussed in the context of other class activities.

Teamwork Handout

The teamwork handout is designed to reinforce the concepts discussed in the lecture and discussion session. It also provides the students with a document that they can refer to throughout the class. The handout was developed using the teamwork KSA's discussed previously as a guide. The intent is to include sections covering all of the KSA areas--conflict resolution, collaboration, communication, goal setting and performance management, and planning and task coordination. The teamwork handout is provided in Appendix A.

In-class Collaborative Exercises

At various points throughout the term, the project teams will work together on in-class exercises. These exercises serve multiple purposes. First, they give the team members additional time to get to know one another. They also provide additional experience in collaborative problem solving. In addition, the exercises present an opportunity for the instructor to observe the teams at work and to offer input on various teamwork issues. Finally, there is a side benefit of allowing reinforcement of subject ea topics through problem solving exercises that may be too large in scale for the students to complete on an individual basis.

Team-based Project

The team-based project represents a major opportunity for the students to put what they have learned about teamwork into practice. Completion of the project requires significant effort on the part of all team members as well as coordination of those efforts. The experience of the project provides students with considerable insight into all of the teamwork KSA's. In order for the project to be successful, the students must learn to resolve conflicts, collaboratively solve problems, communicate with each other, set goals and manager performance, and plan and coordinate tasks. However, the teamwork involved in this project is not the sink-or-swim proposition many such efforts represent. Students are aware of teamwork issues and have received training on effective teamwork. However, without the team project these may remain stale, distant concepts. With the project, the issues become very real and important to the team members. Readers who seek more information on the value of collaborative learning, including team projects, are referred to Feller (1996).

Instructor Monitoring

Throughout the term, the instructor continually monitors activities on the team project. For example, teams are required to turn in a project schedule. This deliverable is checked to verify that the team members understand and have reached consensus on goals and that they have engaged in planning and task coordination activities. In addition, teams that are having problems in other areas such as conflict resolution or communication will find it difficult to complete the schedule. This gives the

instructor the chance to counsel with the team and guide them toward proper teamwork, thus further clarifying and reinforcing team KSA's.

It is of the utmost importance for the instructor to remain an active part of the teamwork experience. Without instructor monitoring of progress on the project and also in learning teamwork KSA's, the method described here stands little chance of success.

PROPOSITIONS AND RESEARCH MODEL

We propose that explicit teamwork training will have a beneficial impact on the students' perceptions of a number of factors. First, the teamwork training should enhance the students' perception of their team's success. Second, being introduced to teamwork concepts should also improve the students' perception of the value and benefits that accrue to those participating in teams. Third, the students' personal beliefs, or affectations regarding teams, should be enhanced by the teamwork training.

To measure the impacts discussed above, the post evaluation instrument developed by Fellers (1996) was administered to undergraduate sections of system analysis and design, and database. In addition, demographic information of age, years of full-time work experience and prior experience with teams was also obtained. The responses to the nine questions and demographics were compared between the two groups. No significant differences were observed, and the groups were combined for further analysis. In total, 89 responses were obtained.

The common factor model (Rummell, 1970) was used to examine this data set. To estimate the amount of common variance that exists within the data set, a number of alternatives have been proposed to estimate the communality of each variable, a measure of the common variance of any one variable (Rummell, 1970). Solutions include the maximum and average inter-variable correlation. Squared multiple correlations (SMC) between the variable in question has been shown to be both the minimum bound for the variables communality estimate, as well as a theoretical acceptable solution (Rummell, 1970).

Factors were extracted using the maximum likelihood technique (Rummell, 1970: Kim and Mueller, 1978). The existence of three factors was indicated by both the scree plot and Bartlett's $\chi 2$ (Rummell, 1970; Kim and Mueller, 1978). Therefore, a three factor model was evaluated using both the VARIMAX and PROMAX rotations (Rummell, 1970; Kim and Mueller, 1978). The PROMAX rotation, which contained the most simple structure (Rummell, 1970) generated the following factor matrix. The three factor solution matches the three factors stated earlier in the propositions.

TABLE 1

ROTATED FACTOR PATTERN

	Success	Value	Affect
Success in accomplishing outcomes	0.79700	-0.00417	0.07774
Success in working as team	0.88342	-0.02542	0.10493
Free of conflict	0.72004	0.01566	-0.21714
Comfort in team outcome being used for evaluation	0.72746	0.06795	0.07731
Valuable learning experience	0.16643	0.78052	-0.10637
Like to participate in teams in future	0.15213	0.56498	0.30472
Teams should continue in curriculum	-0.15341	0.89273	0.12070
Like teams above individual work	-0.07796	0.08468	0.76653
Like to participate in teams	0.02163	-0.02030	0.96997

Cronbach's coefficient Alpha (Cronbach, 1951) was 0.8787. This coefficient is a representation of the reliability of the interitem correlations of

the overall instrument (Nunnally and Bernstein, 1994). Nunnally and Bernstein (p. 265) consider a coefficient alpha of 0.80 to be a standard of reliability.

This study uses a quasi-experimental design (Cook and Campbell, 1979), more specifically, the posttest-only design with nonequivalent groups (p. 98). The initial observation with the control group was obtained at the end of the Spring term, 1997. Treatment group results will be obtained at the end of the Summer 1997 term. The control group learned about teamwork implicitly through their respective projects. The treatment group will be exposed to teamwork training sessions (see Appendix A) during the summer term.
Results from the control group are analyzed as follows. First, a clear initial factor emerged for team success, with questions 1-4 all loading greater than 0.70 on this factor. This factor was moderately correlated with the both of the other two factors at 0.42.

The second two factors were correlated at 0.60. The first of these, loading on questions 5-7, can be interpreted as the overall value of working in a team environment. The correlation between this and the final factor representing the individual's personal affections is logical. The student sees value in working in the team environment, which relates to their individual goals.

CONCLUSIONS

Students in information systems courses commonly work on projects which require teams. We propose that students will benefit from instruction and training on teamwork issues. We anticipate that there will be benefits across three separate dimensions: the overall success of the team, the value of working on a team, and the individuals perceptions of personal benefits from engaging in the team process.

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APPENDIX A

EFFECTIVE SELF-MANAGED TEAMS

IMPORTANCE OF TEAMWORK SKILLS

As you build your skill set in anticipation of a successful career in IS, you should be aware that employers value "soft" skills as much or more than they value technical skills. In a recent survey of employers who hire entry-level IS graduates, teamwork skills, the ability to work with others, and the ability to work in groups were among the most desirable skills with ratings of 4.5 or above (a rating of 5 indicates that the skill is critical).

System development teams are becomiong more and more popular with industry. Most of you an expect to be a member of a team in the course of your career. By paying attention to the guidelines in this document, you can make your team project experience rewarding and valuable.

SELF-MANAGED TEAMS

Self-managed teams, such as your project team, have several characteristics that distinguish them from other types of groups and teams. These are discussed below.

Superordinate goals: Teams are formed in order to accomplish some set of goals. In the case of your project team, the overriding, or superordinate, goal is to complete the project requirements in a manner acceptable to the instructor. This goal needs to be in the forefront of all team members minds at all times. Individual goals are discussed later.

Complementary knowledge, skills and attributes: Recognize that your team represents a unique set of individuals with different knowledge, skills and attributes (KSA). Understanding that everyone on your team is different is an important step toward building an effective team. Just as a basketball team has players who are good outside shooters and players who are good at rebounding, so does your team have members who are good at writing and members who are good at data modeling. When dividing up the work, be aware of these differences and assign tasks accordingly. Be careful here, however. The main purpose of the team project is for the student members to learn. By being involved with the data modeling part of the project, a member who feels uncomfortable with data modeling can become more skilled in that area. However, giving this person total charge of that portion of the project is not a good idea. Teaming them with someone who feels that they are good at creating data models gives both a chance to further their skills.

Resource control: Self-managed teams have control over the resources provided to accomplish the project goals. In the case of your project team, your major resources are time and the team members' labor. Although you are required to hand in task assignments to your instructor, your team has total control over how those assignments are made--the instructor simply wants to make sure that the assignments have been made and that no major tasks are missing. Your instructor can also provide insight into how much time and effort is involved in completing various tasks. The team is responsible for seeking this guidance and for managing time by planning meetings, meeting milestones, etc.

Individual goals: One of the most important tasks for managers is to bring individuals' goals into congruence with the organization\'s goals. The situation is similar with self-managed teams. Although there is no formal manager, there are team and individual goals and individuals must find a way to achieve their individual goals, while still attaining the team's goals. Even though every member will have a unique set of goals, we can assume that most members will have at least three, 1) to learn course material, 2) to gain interpersonal and teamwork skills, and 3) to get a good grade.

Let's tackle these in reverse order. In order to get a good grade, your team must perform well. In order for the team to perform well, the team members must do two things--they must each perform well, and they must function as a unit. So, by working together, and by each member pulling their load, individual team members can accomplish their goal of getting a good grade. Accomplishing the second goal, to gain interpersonal and teamwork skills, can be helped by 1) thinking about teamwork, and 2) being an active member of the team. Thinking about teamwork involves giving real thought to the issues raised in this document and to the teamwork process. You will find that in the course of completing the team project you must compromise on some items in order for the team to do well. Being an active member of the team means completing tasks assigned to you and providing *constructive* comments to other members of the team. The final goal, learning the course material, can be achieved by following the above advice and, of course, by staying up with the rest of your course work. The project is designed to reinforce the concepts discussed in class. If you don't participate in class, complete assignments and read the text, you won't benefit from the reinforcement available in the project, and you probably won't be a very valuable team member.

Notice from the discussion above that the goals are interrelated. By accomplishing the goal of learning the course material and by concentrating on gaining teamwork and interpersonal skills the possibility of

receiving a good grade increases dramatically. Notice also that these goals are not in conflict with the superordinate team goal of completing the project in a satisfactory manner.

Individual rewards: In self-managed teams a portion of an individual's reward is based on team performance. In this class, your external reward is your grade in this class. As the syllabus notes, 25% of your course grade comes from your team\'s project grade. To put it another way, your performance as a team has a significant impact on your individual reward--your grade.

TEAM AND PROJECT ORGANIZATION

If your team is to be successful, it must be organized. There are two aspects to this organization, team and project. Both are discussed here.

Team Organization

Initial team meetings: As soon as you know who is on your team, you should get together to exchange basic information including names, phone numbers, and email addresses. In addition, you should find out each member's preferred contact method (phone or email), meeting times and meeting locations. You will be given time in class to hold this initial team meeting, but little additional in-class time will be available for team meetings.

The next team meeting should take place one or two days after you receive the actual project. Two products should come from this meeting, an initial task list and a preliminary project schedule. These are discussed in the section on project organization. Also, this meeting provides an opportunity to get to know each others' knowledge, skills and attributes. Find out who enjoys writing, who is good at organizing, etc.

Written record: A written record should be kept of each meeting. This record should focus on decisions made by the team. You may also want to briefly state the reasons for arriving at particular decisions. If you fail to keep this record, you will find the team considering the same issues over and over because the team won't remember or won't agree on many decision reached earlier. It is important that these notes should focus on decisions made and the rationale behind them--not on the interpersonal disagreements that, in the long run, matter little to the project. This record should also note any changes made to the project task list, schedule or task assignments. Also, you will want to check off any tasks completed--always a good feeling.

Maintaining focus: It is critical for the team to maintain focus--*keep your eyes on the prize!* Your best friends in keeping this focus are the project schedule and manners (yes, like Mom taught you). Minimizing interpersonal conflict is crucial. Expect this conflict, it's a natural part of being on a team, but remember the overriding goal of doing a good job on the project. Disagreements on individual project components is actually a good thing--the project will be better for the effort taken in working these out. Disagreements rooted in interpersonal problems are a bad thing and should not be allowed to fester. Review these conflicts in terms of the project tasks, not in terms of personalities. Following the hints presented later can help your team accomplish this.

Project Organization

Task list: The task list requires that all members read the project and be prepared to share their take on what tasks need to be accomplished in order to complete the project. While this task list is likely to change over time, your team needs to agree on this initial list of tasks. Once agreement has been reached, the task list needs to be recorded and copies made for each member.

The task list is one of the most important project management tools your team will have. Remember that big problems are solved by taking a series of steps. (This is the point of systems analysis.) A marathon

is completed one step at a time. If you only look at the enormity of the overall project and don't break it down into manageable steps, the magnitude of the project will seem insurmountable. By breaking the project down into tasks, the project suddenly seems easier.

Project schedule: The second product to come from your second team meeting, a preliminary schedule, is derived from the initial task list. In order to come up with a project schedule, the team must add times and priorities to the task list. The first step is to establish the priorities of the various tasks. Some of these will be obvious, others will not. Keep in mind that some tasks require other tasks to be completed before they can be started. For example, most tasks depend on the requirements statement being complete before they can be started. Also remember that some tasks can be done in pallel. Perhaps one team member works on the project write-up while another does report prototypes. Once you understand these priorities, the team needs to come up with the time required to complete each task. When this is done, start from the phase due date and work backwards to determine the milestone for each task. Be sure to put in some slack for unexpected delays. Once these steps are done, your project schedule is complete. Your instructor can review the schedule.

Task assignments: Assigning tasks to individual team members is critical to a successful project. Several factors should be taken into consideration. First and foremost, consider which team member(s) has the proper skills to best complete the task. Although for this project all team members should be capable of performing every task, some members will be better suited to particular tasks than others. Also, consider balancing the work load. Don't overload any one member with more than he can handle--this will only result in missed deadlines and unnecessary anxiety. Make sure each team member takes other class work into account when deciding whether or not she can meet a given deadline. You should also be sure to allow for peer review (described below). You are required to hand in task assignments to your instructor who may offer you some suggestions, although the team is ultimately responsible for making and sticking to task assignments.

Peer Review: One of the advantages of working in a team is having someone to review your work. In order to take advantage of this, you should assign one or two members to review each task output. For larger tasks, such as completing the ERD, two members should be assigned as peer reviewers while one may be sufficient for the review of other tasks. Be sure to allow sufficient time in your schedule for the peer review and for revision of the output. Following this recommendation can significantly increase the quality of your project ... *and your grade!*

A HANDFUL OF HINTS FOR EFFECTIVE TEAMS

- **Assume the best in people**

  Most problems are not the results of malicious intent, but as a result of our frustrations, we start to see problems as being the result of intentional actions on the part of others. Fight this urge. Your team members share many of your goals and, being reasonable people, want to accomplish those goals. The ability to rise above interpersonal differences and focus on the task at hand is a mark of a good team. Make the assumption that your team members did the best they could and work on ways to improve the situation so performance can also be improved.

- **Focus on the task**

  Make every decision, judge every result, resolve every conflict in terms of the task. Putting everything in terms of the task at hand will provide a structure and basis for making decisions and planning actions. This also prevents the team from getting off track.

- **Establish regular meetings**

  To avoid miscommunication, establish a regular time and place for team meetings. In these meetings you should 1) provide updates on task progress, 2) discuss any problems that individuals may be having with their tasks, and 3) update the task list and schedule if needed. By holding these meetings, everyone can stay on the same page and problems can be dealt with while they are still relatively minor.

- **Handling negative feedback**

  It's important to fix the problem, not the blame. Blaming a particular member does little good. It's usually more productive to 1) solve the problem and 2) establish ways to avoid a recurrence of the problem. A criticism should be viewed as an opportunity for improvement. The best in any field work on their weaknesses so negative feedback is simply an opportunity for the member and the team to become stronger. It's also important to focus not on the individual but on the task at hand. Frequent feedback (both positive and negative) is important. This can establish an atmosphere of mutual coaching.

- **Focus on behaviors**

  Behaviors are easier to modify than are attitudes. Saying "You're a lazy jerk" to a team member may reflect a fact, but it is unlikely to result in any benefit to the team. Instead, focus on the behavior that needs to be changed; "The team needs you to complete your tasks on time. What can we do to help you accomplish this?" This approach lets the team member become more effective and also display's the team's willingness to help.

- **Positive feedback**

  Remember that you are all managers, and a good manager recognizes good performance. When a member performs well, other members should be sure to praise that effort. This both reinforces positive actions and also softens the blow of any later negative feedback (i.e. criticism).

- **Dealing with failures**

  Your team is going to have occasional failures; expect them and see them for what they are-- an opportunity for improvement. The team should accept responsibility as a team and should look for ways to avoid such failure in the future. If handled properly, a mistake should not be repeated.

- **Ask for help if you need it**

  This suggestion applies to individuals and to the team. Individuals who find changes in their circumstances should ask their team members for help before the problem becomes insurmountable. Don't wait until two days before the project is due to inform your team of problems in completing your assigned tasks.

  The team as a whole should not hesitate to ask for input from the "manager" (your instructor). Going to someone outside the team does not mean that the team is incompetent. Remember that you are in a learning situation--the sole purpose of the team project is for you to learn. If the team is unable to solve a problem, ask the instructor (who will, of course, politely inform you if the team needs to put more effort into solving the problem).

- **Involve everyone**

  Teams often have both mice and loudmouths. Input from both is valuable so the team should strive to involve the mouse and to prevent the loudmouth from dominating. Ask quiet members for their input and ask more vocal members to summarize their views. Each team member should also contemplate whether they are a mouse or a loudmouth and modify their behavior accordingly.

- **Dealing with deadlocks**

  Sometimes factions within the team will take opposing views. Among the more useful strategies is to have each side debate from the other's point of view. Another suggestion is to point out common ground and look for a possible alternative strategy. Remember to view these disagreements in light of the overall task. Most important of all, limit the time you spend on deadlocks for relatively unimportant issues. For example, deciding what color to use for input screen text is not worth a two-hour debate. Flip a coin and keep moving toward the finish line.

- **Communicate actively**

  Communication takes two. Responsibility for effective communication is shared by the sender and the receiver. The sender is responsible for expressing ideas in an effective manner. The receiver is

responsible for actively trying to understand the message and for seeking clarification if necessary. Only through active participation in the process can effective communication occur.

- **Focus on results**

  Stay on track. Keep thinking about the overall goals of learning and producing a good project. Consult progress against the project schedule frequently--it should be a major focus of every group meeting. When faced with the inevitable hurdles that crop up, remember that there are overriding goals in place. Look toward the finish line, and the hurdles become smaller.

MANAGING INTRA-GROUP CONFLICT

- Don't let interpersonal conflicts escalate beyond control.

  Just as a minor scratch can, if neglected, become infected, many problems and conflicts which begin as relatively minor irritations can fester into major issues when unresolved. Deal with difficulties when they are still minor and easy to resolve.

  Try the following tips for conflict resolution:

  A. Put the problem or conflict in perspective with the overall goal of the project.
  B. Try to identify the common ground --the risks and benefits the sides have in common.
  C. Give everyone a chance to air their point of view on any issues involving them.
  D. If needs and expectations are unclear, ask clarifying questions.
  E. Emphasize the common goal--to do a good job on the project.
  F. Remember that the responsibility for resolving the conflict rests with the entire team.
  G. One more time, deal with the conflict while it is still small and easy to resolve.

- Remember that a certain amount of conflict is healthy.

  Many conflicts arise as the result of skilled people who care about the team\'s success--they simply have a difference of opinion. There is usually some right and some wrong on both sides. Taking the time to resolve the conflict often results in better ideas than if the conflict never occurred.

- Remember to respect the ideas of others.

  Fight the urge to judge new ideas immediately. Being open to the ideas of others makes you and the team more effective. If only your ideas are valuable, there is little point in having a team.

- Use the following steps to resolve conflict:

  1. Acknowledge the existence of the conflict.
  2. Look for common ground.
  3. Even if you don\'t agree, consider other points of view.
  4. Develop a plan of action showing what each member will do to resolve the problem.

(Note: The above items are derived in part from experience and in part from two useful resources, the book *Tips for Teams: A Ready Reference for Solving Common Team Problems*, by Fisher, Rayner and Belgard, McGraw-Hill, 1995, and from Gerard Blair "Groups that Work" which is located at http://www.ee.ed.ac.uk/~gerard/Management/art0.html.)

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