

Chapter I

Teaching Teamwork in Information Systems

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ABSTRACT

Teamwork is very important in information systems development. Therefore, most courses in systems analysis and design and many programming courses require students to work on group projects. However, a project group is not the same thing as a *team*. Furthermore, for a group to become a team, there are several important characteristics that must be developed. These characteristics do not always develop automatically. This chapter discusses the requirements for effectively forming, building, managing, and evaluating teams in information systems courses. Students should be taught these concepts in addition to the regular course content. This chapter also addresses two special issues that deal with team development and team management: managing cultural diversity and managing “virtual” teams, where the team members are geographically separated.

INTRODUCTION

Teamwork has been the norm for the development of many information systems (IS) projects since the early days of computing. Teamwork is also known to be an effective teaching and learning technique. Therefore, many IS classes in systems analysis and design, and also in programming, use

student teams for class projects. However, just because students are required to do their projects with other class members, it doesn't necessarily follow that they learn about effective teamwork. In fact, from previous experiences with classroom teamwork, many students dread taking another class that will require teamwork assignments. Why? It is because their experiences were filled with all sorts of problems and frustrations that they do not want to repeat. It is important, then, for many reasons, that IS instructors know about managing effective teamwork. And it is important that they *teach* teamwork in their courses, so their students will be prepared for effective teamwork in the "real world."

In 1999 an informal survey of the six top-selling college textbooks on systems analysis and design revealed that the word "team" or "teamwork" only appeared in the index of two of the books. These six books had a combined total of approximately four pages devoted to a discussion of teamwork or developing and managing effective teams. Informally, instructors will admit that one-fourth to one-half of their student project groups develop serious problems, and want to "fire" (or, "divorce") one or more of the group members. Obviously, those students have not learned how to work well in teams. In a "field quasi-experiment," VanSlyke, Trimmer and Kittner (1999) found that "... investing valuable class time on teamwork training can provide significant benefits. Student team members who receive teamwork training feel that their teams are more successful as a result" (p. 43).

The purpose of this chapter is to summarize what is known about effective teamwork, both in the "real world" and in the classroom. This chapter will also describe several specific techniques, activities, tools, and readings, which may be used in the classroom to *teach* teamwork rather than just assigning group projects to students.

BACKGROUND

Teamwork

What is a team? "The distinction between a work group and a team is an important one.... A work group becomes a team when shared goals have been established and effective methods to accomplish those goals are in place" (Wheelan, 1999, p. 3). A team, therefore, is more than just a group of individuals. For the purposes of this chapter, the following definition of a team will be used:

"A team is a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach

for which they hold themselves mutually accountable” (Katzenbach and Smith, 1993, p. 45).

Working together as a team is more effective than working as individuals. “Teams outperform individuals acting alone or in larger organizational groupings, especially when performance requires multiple skills, judgments, and experiences (Katzenbach and Smith, 1993, p. 9). It is for this reason that thousands of books and articles on teamwork have been published over the past few years.

But teamwork in information systems is not new. In 1971 Gerald Weinberg wrote *The Psychology of Computer Programming*, in which he devoted a chapter to “The Programming Team.” In the first paragraph of the chapter, he notes that, “The interaction of two programmers looking over a program that either one of them could have worked out is entirely different from the interaction of two programmers working on separate parts of a whole, which is too great for either one to produce” (p. 68). In 1998, he published a “Silver Anniversary Edition” of the book, which contained the original work with updated comments on each chapter. In these recent comments he says, “Over the years, I’ve observed that the requirement to develop capability cannot be met adequately by a single person. We learn much faster and much better with the active cooperation of others” (p. 5.i).

It has been traditional in most systems analysis and design classes, as well as many programming classes to assign students to group projects, in order to give students the advantages and experiences of teamwork. However, many instructors do not explicitly teach the principles of teamwork. Nor do they consciously encourage the development of the characteristics that are identified with successful teams and successful teamwork.

Successful Teams

What makes teams successful? Katzenbach and Smith’s (1993) definition, quoted previously, included the following characteristics for a group to be called a team:

- Small size
- Complementary skills
- Commitment to a common purpose
- Have performance goals and approach
- Hold themselves mutually accountable (p. 45)

Other authors propose similar lists of characteristics that are required for successful teams. For example, Skopec and Smith (1997, pp. 12-15) identify six characteristics of what they call “Blue Chip Teams.” These include:

- Identity
- Mission
- Great expectations
- Commonly accepted procedures
- Feedback
- Team-building

Hoffer et al. (1996) list the following as critical issues in teamwork:

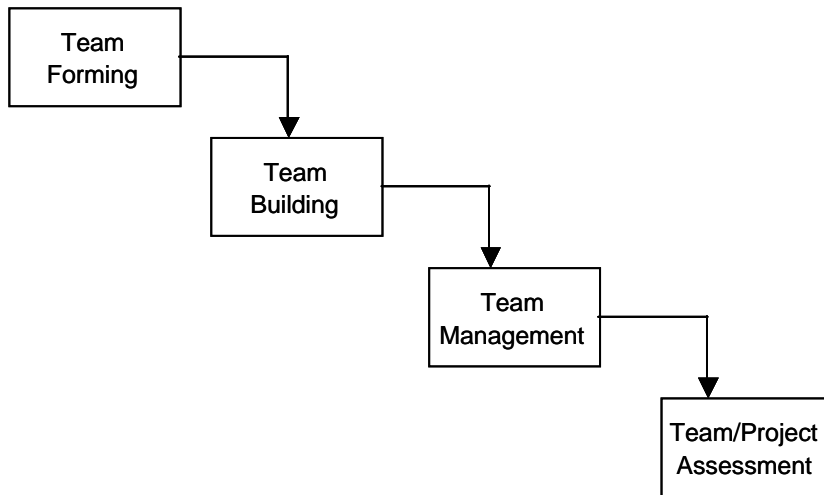
- Selection of team members
- Having a common purpose (goal) and a commitment to the goal
- Mutual trust among competent team members
- Interdependence among team members
- Good communication among members
- Sense of empowerment and proper support from management
- Team-building skills (from training)
- Socializing and celebration

If students are to learn how to work effectively in teams, they need to understand these characteristics and the instructor should encourage the development of these characteristics in our student project groups. “Again, students need to be taught the interpersonal communication and team building skills that will help to ensure smoothly functioning groups. And we have a responsibility—if we expect them to work together—to provide that training” (Breslow, 1998).

Stages of Teamwork

Just as IS instructors identify multiple stages in a systems development life cycle (SDLC), teams are also thought of as developing in stages. In order to develop successful student teams, the instructor must communicate what the stages are, and encourage the successful development of each stage. Tuckman (1963) described a model of team development in four stages, naming them *forming*, *storming*, *norming*, and *performing*. His model is often cited in literature as well as in business. In Tuckman’s model the *forming* stage is the initial orientation and establishment of relationships between members. The *storming* stage is “characterized by conflict and polarization around interpersonal issues.” When the group moves beyond that conflict, new roles are developed and “ingroup feeling and cohesiveness” are developed; this is the *norming stage*. Finally, the group reaches the *performing* stage, when they develop roles that are more “flexible and functional,” allowing them to achieve higher levels of performance (Tuckman, 1965, p. 396)

Figure 1: The Team Development Model (Source: Author)



This chapter, however, has a slightly different model, because we are considering what stages a team will go through from the perspectives of the instructor and the students. The stages to be used in this chapter are: 1) Team Forming, 2) Team Building, 3) Team Management, and 4) Team and Project Assessment. Figure 1 models the four-stage model for a successful classroom team project.

Stage 1: Forming Teams

In the first stage, the groups are formed. In business, managers will assign employees to teams. Sometimes a team is formed just for one particular project; other times teams are formed and will continue to work together on many projects. In the classroom, student teams should be formed as early as possible, to allow some time for the team-building stage, before the real work of the projects begin. Successful student team formation requires that the teams be of an appropriate size and that the selection of team members is done according to consciously defined criteria.

Team Size

Katzenbach and Smith (1993) note that “virtually all the teams we have meet, read, heard about, or been members of have ranged between two and twenty-five people” (p. 45). In the classroom, student teams are usually three to five members in size. If the group consists of only two members, there is the risk of one member having to drop out, and the remaining student is left to do the entire project alone. When the group is larger than five students, it becomes

significantly more difficult to coordinate the work and to ensure that all members can arrange for a time to meet together. In addition, it is important that all members can understand all parts of the project, and contribute equally to the team. After all, the main purpose of the classroom group project is to have students learn the subject matter of the course, whether it is programming or systems analysis and design. Therefore, it is important that each member of the team be involved with, and understand, all parts of the project. A group that has more than five members makes this nearly impossible. Breslow (1998) suggests that, although four or five members are usually recommended, the number should be adapted to the amount of work to be done and to problems of logistics for the students. Howard (1999) suggests three to five members per classroom projects, and that “an odd number is recommended for greater success in working through conflicts.”

Team Composition

There are several methods that are used to select the members of teams. Many instructors allow students to do self-selection. There are several arguments as to why this is not the best alternative. First of all, this is certainly not the way teams are formed in “the real world.” Self-selected teams tend to be very homogeneous in composition. In one study, Baugher et al. (2000) found that self-formed teams will have less diversity of gender, race, and cultural background than groups that are randomly assigned. Although some would argue that homogeneity in teams will more likely result in less team conflict and better team performance, diversity in teams presents better learning experiences (Robbins, 2001). It may be argued that more conscious learning about teamwork can take place when students are not allowed to choose to work with the friends that they have worked with many times before.

Furthermore, as Katzenbach and Smith (1993) note, team members should have “complementary skills.” These complementary skills for IS students will, naturally, include the students’ backgrounds in terms of previous courses as well as their work experience in IS. Therefore, it is important that an instructor collect such information from the students. It is good to begin the course with a questionnaire that asks about experience with basic business software, programming languages, and the amount and type of relevant work experience that each student has. Students, then, may be placed into teams based on their knowledge and experience in the course subject matter. This would correspond with the concepts of chief programmer teams, as proposed by Mills (1970) and also described by Brooks (1995), where they describe programming teams using the analogy of surgical teams, where a highly skilled and experienced surgeon is supported by team members with other skills, and/or lesser skills. It also compares with systems development teams

in businesses today, where a senior systems analyst is assigned to each team, to guide the less experienced team members through the project.

Personality characteristics are also important factors to consider when forming teams. Most educators are familiar with the “*Myers-Briggs Type Indicator*® (MBTI®) instrument, [which] is the most widely used personality inventory in history.” (For more information on this, see the following website: <http://www.meyers-briggs.com/products/mbti/index.asp>.) This personality test may be used to help gain an insight into the differences between potential team members. Several other personality tests are presented and described in Robbins and Hunsaker (1996). These may be used to assess the students’ personalities, which could be used as one of the criteria on which team composition is based. See Classroom Activity 1 for a suggestion on how to administer and use a personality assessment in the classroom. Whether or not students’ personalities are part of the basis, or the whole basis, when forming teams, it is helpful for the instructor and the

Classroom Activity 1: Personality Styles

Have students take the “SAQ 4, Interpersonal Style Questionnaire,” which may be found in Robbins and Hunsaker (1996, p. 18-30).* The questionnaire has 18 pairs of statements. Students are asked to rate themselves as to which of the statements in each pair is most descriptive of themselves. It only takes about 15 minutes for students to complete this questionnaire and then score their own results. These results will classify a student into one of four personality styles: *The Relater Style*, *The Socializer Style*, *The Thinker Style*, or *The Director Style*.

After students have rated themselves, have the students move so they are sitting in four groups, one for each of the personality styles.

Each group should discuss the four personality styles and develop a list of why they would want to be placed on a team that has a member from each of the other personality styles. For example, the *Relaters* should list why they would want to have a *Director* on their team, what the advantages would be in having a *Thinker* on the team, etc.

This activity will foster discussions that will encourage students to understand and to value the diversity of personalities and skills in team members.

*The SAQ is originally from Tony Alessandra and Michael J. O’Connor, *Behavioral Profiles: Self-Assessment* (San Diego: Pfeiffer & Company, 1994).

students to understand the variety of personality types and how this might affect intra-team communication and relationships.

Other team member selection criteria

Criteria other than the students' IS skills and personalities may also need to be considered for practical reasons. These criteria include the students' work/study schedules, and their geographical proximity or distance from other students. These factors can present logistical problems for a student team. If these are significant criteria for the students at your school, you could create a blank daily schedule form. Each student should mark on the schedule the times when he/she cannot meet with a team. With different symbols, they could identify when would be the best times to meet with their team and other times that, perhaps, would not be best, but would be possible. It is important to recognize that many of our "non-traditional students" are working full-time while they are attending classes. Thus, their schedules may be at least as important as other criteria.

Another option in forming the teams would be to collect information in all of these areas: skills, personality, and schedules. Then, with all factors in a spreadsheet, the instructor could work through, making compromises where they seem most appropriate.

Stage 2. Building Teams

"Team building refers to activities aimed at enabling a group to become a cohesive working unit capable of functioning at the highest performance levels. Effective team building helps a team establish an appropriate organization and work culture, and accelerates the accumulation of experience in functioning as a team" (Weinberg, 1995, p. 38). Assigning students to a project group does not automatically, overnight, make them into a team. To have truly effective *teams* instead of typical classroom work groups, there should be some conscious effort at team building. Harper and Rifkind (1995) list several guidelines for team development. These are listed in Table 1: Guidelines for Team Development, and are discussed in the following paragraphs.

1. *Get to know one another.* In order for there to be good communication and mutual trust among team members, they must have some means of getting to know one another and to "break the ice." The most obvious thing that students need to do first is to learn each others' names, exchange addresses, telephone numbers, etc.
2. *Seek ways to "connect" team members.* The students should be encouraged to at least briefly introduce themselves to each other, perhaps sharing

some of their previous educational and work experience, family background, and so on.

Some classroom exercises may be used for the ice-breaking as well as to illustrate points later in the course. See Classroom Activity 2: Breaking the Ice.

3. *Develop a team vision.* In this step the team members need to begin to communicate with each other about their vision, goals, and objectives relative to the course and the group project. To encourage the group to form a common purpose (goal) and a commitment to the goal, various authors, including Marble (1992, 1993), suggested that the group begin by developing a common identity. The first group assignment may be to decide on a name for the group, as if they were a consulting company. They should design a logo and the letterhead for their correspondence, and they should write a mission statement.
4. *Develop a group character.* With the mission statement, the team is establishing standards of quality for their team work. The group should also plan for their meetings. When will they meet? Where will they meet? Each student should sign a commitment that he/she will hold to the quality standards set forth in their mission statement and allocate meeting times, as planned. Students should be assigned readings, or given handouts, that describe the various roles that need to be established for an IS team to be effective. See Table 2: Student Roles in Teams for a suggested list of roles and activities that may be required on an IS team. The members might assign individuals to those roles, or adapt the roles to fit the number of students in the group and the talents and personalities of the members. They may also write job descriptions for

*Table 1: Guidelines for Team Development**

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|---|
| <ol style="list-style-type: none"> 1. Get to know one another. 2. Seek ways to “connect” team members. 3. Develop a team vision. 4. Develop a group character. 5. Create a context that is safe for team participation. 6. Discuss each of the phases of team development as they occur. 7. Develop task processes 8. Establish mechanisms for team self-assessment and improvement. 9. Find ways to celebrate the team and its accomplishments. |
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*From Harper & Rifkind, 1995, pp. 66-68.

Classroom Activity 2: Breaking the Ice

In *People and Project Management*, Rob Thomsett (1980) describes “The Tinkertoy, Game.” This is an exercise that “simulates a typical user, analyst, and programmer situation.” A target model (swing set, for example) is constructed ahead of time and placed in a nearby room where it is not visible to the class. Each team is given a package of Tinkertoy pieces* from which they will be asked to reproduce the target model. There is a race to see which team can replicate the model in the shortest time.

One team member is the *user*, who will be allowed to see the target model and will then have to describe the model to the *systems analyst* so the systems analyst can relay that information to the *programmers*. The programmers then have to build the model.

As described by Wells (1999), this activity may be used to illustrate several concepts:

1. *Communication is difficult.* The *user* may have a very clear picture of what he/she wants, but it is very difficult to communicate exactly what is desired.
2. *Drawing system models helps with communication.* At first, the communication is only verbal. When they are allowed to draw pictures, the task is made much easier.
3. *Decomposition is important in complex projects.* The most successful teams will use a top-down approach in describing the model and its parts.
4. *Analysis before development.* In the most successful teams the *analyst* takes a long time with the *user* before running to communicate with the *programmers*. It is important to fully understand what the *user* wants before beginning construction.

This exercise can help the team members work together, get to know one another, and have fun together, before beginning the real “work” of the class project.

*Note: Tinkertoy sets are relatively difficult to find nowadays. K’NEX®, are the modern-day equivalent, and may be found in most toy stores. For more information on this activity, see Wells (1999).

the roles and résumés for the team members. Whether or not these roles are formalized and maintained, it is helpful for the students to know what responsibilities are necessary to have a successful team project.

5. *Create a context that is safe for team participation.* Harper and Rifkind (1995) propose a code of ethics for teamwork. Their code of ethics is briefly listed in Table 3. It would be good for the students to read this code of ethics and adopt it, or adapt it, for their own group. The activity of discussing the code of ethics and of addressing the issues and conflicts that can arise in group projects will be a positive step in the team-building process.
6. *Discuss each of the phases of team development as they occur.* If the students are guided into reading and discussing articles on team development,

Table 2: Student Roles in Teams

<p>Presider/Meeting Leader</p> <ul style="list-style-type: none"> • Keeps group's meetings on task • Develops and distributes an agenda for each meeting • Monitors the group's progress
<p>File Manager/Project Master</p> <ul style="list-style-type: none"> • Keeps assignment/project files secure; makes backup copies • Makes sure all members have current copies of assignments • Coordinates and integrates the project components • Maintains frequent contact with the other group members for project updates
<p>Meeting Coordinator</p> <ul style="list-style-type: none"> • Knows the schedules of all team members • Decides the dates and times of team meetings • Notifies members of scheduled meetings • Has the authority to call a meeting if no conflicts exist with any member's official schedule
<p>Intermediary</p> <ul style="list-style-type: none"> • Acts as the primary contact between the group and the course instructor • Meets periodically with the instructor to report on group progress • Should keep aware of how the team is progressing on the project and whether there are any major conflicts between group members

and if they understand that Tuckman's (1965) *storming* is a normal stage for teams, it will help them understand what is happening. Team members should view diversity and some conflict as an asset. The personality inventory results and the activities suggested earlier can help to begin the process of valuing diversity. Other comments on diversity and cultural differences will be discussed later in this chapter. Having the students read articles that discuss the values of different viewpoints, the advantages of diversity, will help. When conflict arises, it will be comforting for the students to know that this is a normal part of the team development process. Managing team conflict will be discussed in a later section. For this guideline, though, students should be encouraged to keep a journal. Although it may be tempting for them to just record project data in the journal, a journal can serve a much better purpose if it is used to record team process observations. Students should record dates and decisions, meeting attendance, and other facts in the journal. However a journal is an especially good place to record the difficulties encountered in making decisions, feelings about the team and its processes, and other items of introspection about teamwork.

7. *Develop task processes.* After assigning roles for the team members, there should be agreements about how some of the tasks will be done. For example, who will pay for photocopies? What about the team project notebook? How will they communicate with each other, outside of meeting times? These may seem like minor decisions, but they help to increase communication and develop more of an identification with the team.
8. *Establish mechanisms for team self-assessment and improvement.* In this stage, the instructor can guide students. It is often difficult for students to honestly and tactfully address their weaknesses and how to

*Table 3: Code of Ethics for Teamwork**

<ol style="list-style-type: none"> 1. Team members should accept responsibility for their own actions. 2. Team members should act so that the potential for future teamwork is maximized. 3. Team members should maximize individual freedom of choice. 4. Team members should act so that the respect of each participant for self and for others is maximized. 5. Team members should act to improve communication. 6. Team members should view diversity as an asset. <p>* From Harper and Rifkind, 1995, p. 66.</p>

overcome problems. In the stage “Managing Teams” (below) are some suggestions that the instructor may use to give the students a start on discussing performance issues.

9. *Find ways to celebrate the team and its accomplishments.* Although many college students will not need encouragement to socialize and celebrate, other teams become so intense and have so much stress from their work, classes, and family obligations, that it is very difficult for them to celebrate. But this also will help to increase the team spirit, their unity and identity. Let the students know that it is good to celebrate accomplishments, to have social times as well as work times.

Stage 3: Managing Teams

From the lists of characteristics of successful teams, it is obvious that team members must share a common goal or mission, have a defined set of procedures, and feel a sense of empowerment and proper support from management. In this regard, the instructor should act as a good business manager. That is, he/she should give clear assignments, describe the project work that needs to be done, when each part of the project is due, and be available to give direction when it is needed. However, to encourage the sense of empowerment, the instructor should take care not to “micro-manage” student teams.

There are several types of short questionnaires that may be used to help team members gain insight into their communication patterns, responsibilities, and inter-personal skills within the team. For example, after the teams have been working on their project for a while and have completed some of the project requirements, a questionnaire dealing with team leadership could be developed. The questionnaire could be in the form of a table. The first column would list the activities that are needed by successful teams. (See the bulleted items in Table 2: Student Roles in Teams.) Each student fills in the table, with the name of each team member as a column heading. The last column can be assigned to “No One.” For each activity, the student should assign a value of “1” in the column of the member who mostly does that function. A “2” could be entered for another team member who also contributes to that activity. The last column will exist in case *no one* has been doing that activity.

Another questionnaire, with a similar tabular design, could list the specific project assignment activities and deliverables, broken down into detail. For example, if the teams have completed the project planning phase, the list might include 1) conceptual planning of the activities, 2) constructing the PERT chart, 3) typing the report, etc. As in the students’ questionnaire about

roles, numerical ratings could be entered into columns to show which student(s) have worked on each part of the project task. A “1” would be assigned to a team member that worked alone on that task. A “2” would be assigned to each of two or more team members who shared responsibility for that task. When this assessment is done several times over the life of the project, the work levels of the team members will become more balanced.

A third questionnaire might ask each student to rate, on a scale of 1 to 5, the team climate, including concepts such as openness, support for individuals, addressing conflicts, etc. There are many short questionnaires dealing with such topics in Robbins and Hunsaker’s book (1996).

All of these questionnaires (on communications, tasks, etc.) can help the instructor diagnose when problems are developing and help teams design methods of solving those problems. As was stated earlier, an instructor should not micro-manage the student teams, but as a manager, the IS instructor should meet with teams one or more times during the course to check on how the teamwork is progressing. If the instructor just meets with a team and asks, “How is it going? Are you all getting along okay? Any problems?” the answers will nearly always be just general reassurances that things are okay. By using specific questionnaires, which are completed by the individuals and submitted to the instructor before he/she meets with the teams, there will be specific topics that may arise and need to be discussed. In fact, just the activity of completing the questionnaires will cause the individuals to assess their roles and activities. They will become aware of the amount of work some members are neglecting, while others must carry most of the load.

Managing Conflict

Conflict is a part of teamwork. This is the *storming* stage of Tuckman (1965). The question is not whether there will be conflict, but how to address the conflict and have it not escalate into large battles. A positive view of conflict is given by Katzenbach and Smith (1993), in which they state:

Conflict, like trust and interdependence, is also a necessary part of becoming a real team. Seldom do we see a group of individuals forge their unique experiences, perspectives, values, and expectations into a *common* purpose, a set of performance goals, and approach without encountering significant conflict. And the most challenging risks associated with conflict relate to making it constructive for the team instead of enduring it (p. 110).

To address the ways to manage conflict, it may be helpful for the instructor to read some articles on conflict resolution. Have students also read them, so their awareness will be heightened and they will be given positive ways of addressing conflict. Suggested sources include Harper and Rifkind (1995), Wheelan (1999), Skopec and Smith (1997), Robbins and Hunsaker (1996), and Katzenbach and Smith (1993). Skopec and Smith (1997) list several views of group conflict and offer several suggestions for conflict management (pp. 87-98). Lewis (1993) also has a large part of his book devoted to understanding team dynamics and managing team conflict. Assigning an article or two on conflict resolution may also enable students to admit that they have problems and give them a safe climate in which they can discuss positive solutions. There are also excellent videos on conflict resolution and assertiveness training that are available from libraries or commercial sources.

Stage 4: Team and Project Assessment

Virtually all classes require that the instructor assign grades. This means that an assessment must be made for the teams/ team projects. Several issues need to be discussed with regard to assessment of the teams and/or projects. Young and Henquinet (2000) discuss team project evaluation in terms of a two-by-four matrix. The first question that must be addressed is the *purpose* of the assessment. Is the purpose only to evaluate the results of the teamwork—the project deliverables? Or, is the purpose to evaluate how well the students worked together as a team? Young and Henquinet (2000) describe this as an issue of *product* versus *process*. The instructor may choose to evaluate both product and process, depending on the goals of the class. If class goals include both learning how to do systems analysis and design or about writing good software (i.e., *product*) and learning about learning group dynamics, communicating well with other team members, attending all meetings, etc. (the *process*), then these goals should be stated in advance and should be given appropriate weights in the assessment process.

Another question that needs to be asked is whether all students on the same team should be given the same grade. Some authorities argue that if the team is to be committed to a common goal and to work cooperatively toward that goal, it is important for them to know that they will be evaluated as a team. As Skopec and Smith (1997) say,

“One of the seminal articles in the literature of compensation management is entitled ‘On the Folly of Expecting A While Rewarding B,’ by former Academy of Management president

Steve Kerr. His point is at once simple and profound: companies cannot hope to direct work behaviors in one direction while the compensation system directs them in another direction” (p. 123).

If students expect to be evaluated as individuals, rather than as a team, there will be some students who will intentionally take on more work than is fair. Some have even been known to call team meetings at times they know other members cannot meet. This will ensure that the work and credit that might have been shared with other team members will be done only by themselves, so they can honestly claim to have done most of the work on the project. Such attitudes do not encourage good teamwork.

On the other hand, it must be acknowledged that there are, at times, freeloaders, or slackers, on student teams. If they are to be evaluated as a team, some students will enjoy the free ride, and let the other team members work for the grade that they will all be given. Is it fair to have one student pass the course because their (other) team members were intelligent, hard workers, while he/she did nothing? Kagan (1995) argues strongly that group grades are not fair, and can cause a number of problems for the instructor.

What is the solution? The arguments for a common team grade and the arguments for individual grades all seem reasonable. A compromise may be made. For example, the grade may have about one-fourth of the grade allocated to the individual's participation. Have each student assign a portion of the “individual effort points” to each of the team members. For example, if there are four team members and 100 points is a perfect score for the team, then 25 points for each team member would indicate that they all cooperated well and the work was evenly divided among the four. If one member has not contributed his/her share, then that member's points may be given to other team members, arguing that overall the project score would have been higher, had that member done as well as the other members. Be sure that each team member adds comments to the evaluation to support his/her assignment of the points. Experience shows that there is usually a high level of agreement among the team members on this score. This type of scoring rewards teams that have worked well together, divided up the work, and given each other the support that they needed. It also leaves the remaining 75 percent of the team's score to be a group score, to encourage the high performance of the team as a whole.

Colbeck et al. (2000) discuss other alternatives, such as dividing the project into parts, some of which should be done by individuals, and other parts that should be done by the group. Then the course will have evaluations based on both individual and team performance.

The final question, the other dimension of the Young and Henquinet (2000) matrix, is that of *who* should do the evaluation. They identify four possibilities. In most traditional courses, it is the instructor, alone, who must

evaluate both the team and the resulting project. However, team members may also be asked to evaluate themselves and the other members of their team. A third option is for those who are classmates, but outside the team, to evaluate the team (product, usually not process, in this case). A fourth possibility is to have the team projects evaluated by people outside the classroom. The teams may be asked to give presentations and documentation to other faculty, or to local IS managers, so they may also be involved in the evaluations. If the team has been working on a project for some department or organization outside the classroom, representatives of those units should also be asked to evaluate the project.

Regardless of who all are involved in the assessment process, the team members and all evaluators should be given the evaluation criteria and the forms ahead of time. This will make sure that everyone is aware of the grading criteria. Of course, in order for the team members to have established the proper common goals, they should have been aware of the entire evaluation process from the beginning of the project.

*Table 4: Seven Cultural Dilemmas**

<ol style="list-style-type: none"> 1. Universalism vs. Particularism. Refers to whether the culture focuses on rules that apply to everyone, or if particular circumstances are more important than the rules 2. Individualism vs. Collectivism. Is quality of life defined by the conditions of individuals or by society as a whole? 3. Neutral vs. Affective Relationships. Do we display emotions to others? 4. Specific vs. Diffuse Cultures. Refers to how long it takes to be allowed into a person's private areas, or how large the private areas are for individuals. 5. Achievement vs. Ascription. How does a person get respect and status? Does it come from accomplishments, or does it come from age, class, gender, etc.? 6. Internal vs. External Orientation. Does the person believe that he/she can control everything, or do nature, events, and other people control the individual? 7. Past-Oriented vs. Future-Oriented. Relates to the time dimension. This has to do with respecting the past, looking toward the future, keeping schedules, etc. <p>* Adapted from Berger, 1996, pp. 18-28.</p>

CURRENT AND FUTURE TRENDS

Two trends that already have considerable influences on our teamwork and our classrooms are cultural diversity and the use of technology to enable classes and teamwork to take place over long distances. Because they offer other dimensions to developing and managing teams, they are discussed separately in the following sections.

Managing Cultural Diversity

One issue that has been gaining more attention over the past few years is cultural diversity in society, in universities, in businesses, and, therefore, in teams. Culture may be defined as a type of collective programming of the mind. This programming begins as soon as a baby is told what to do and what not to do. Harper and Rifkind (1995, p. 29) use Dodd's (1991) definition of culture: "The total accumulation of an identifiable group's beliefs, norms, activities, institutions, and communication patterns."

Berger (1996) describes seven dimensions of culture. These dimensions deal with three areas: "our relationships with other people, our relationships with nature, and our relationship with time." These seven dimensions he presents as dilemmas that affect our management style, human relations programs, and relating to others in a group. Table 4 lists and briefly describes the seven cultural dilemmas. Berger (1996) describes each of these dilemmas in more detail and then discusses management applications and ways of reconciling the differences.

The most recent U.S. Census report confirmed what most communities already knew, that diversity has significantly increased in the past few decades. In recent years there has been such a shortage of programmers and others with special skills in information technology, that immigration quotas for the United States have been adjusted to bring in more of these skills from other countries. Most of the universities with significant numbers of students in IS and/or computer science will also have an increasingly diverse range of cultures, both in the students and in faculty members. And, even if our students don't physically leave their community, the Internet and its applications have made computing to be an international meeting ground. The applications our students will be developing will be much more oriented to regions beyond where they physically live and work. Therefore, there is an increased demand on teams to understand and manage cultural differences.

Cross-Cultural Work Groups (1997), edited by Granrose and Oskamp, is devoted to discussing the various aspects of cultural diversity and the influence of cultural diversity on work groups. This diversity affects interpersonal relations, job

satisfaction, and work productivity. Recognizing cultural differences is only one step toward avoiding or resolving cultural conflict.

The teamwork code of ethics cited earlier, exercises in valuing diversity among team members, and the already suggested readings in conflict management will help to set a climate of understanding among individuals, regardless of their cultural differences.

Managing Teams Across Distances (Virtual Teams)

The second recent issue that is increasing in importance is that of managing distance among team members. Many more schools are offering “distance learning” as part of their curriculum. Businesses are often multinational, with a need to have teams in more than one country. How we can build and manage project teams that may have members spread out over large distances? Although we may also call these “virtual teams,” that label may be misleading. The teams are *not* virtual, in the sense that they are *real*. For them to be real teams, they must go through similar development stages and provide the same advantages as do our face-to-face, classroom-based student teams. Lisa Kimball (1997) cites several things that “need to happen in order for organizations to make effective use of virtual teams” (p. 1). These things are listed in Table 5.

*Table 5: Requirements for Effective Use of Virtual Teams**

<ul style="list-style-type: none"> • Processes for team management and development have to be designed, defined, piloted, tested, and refined • Team managers have to be trained in new team management strategies • Team members have to be trained in new ways of working • The culture of the organization has to be reshaped to support new structures and processes • Organizational structures have to be modified to reflect new team dynamics • Rewards systems have to be updated to reflect new team structures • New information technology (IT) systems have to be built to support teams • New management, measurement, and control systems have to be designed <p>*From Kimball, 1997.</p>
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Many of our traditional classes are learning to use virtual classroom technology to support and enhance their traditional teams. Several forms of media may be used. They include video conferencing, audio conferencing, electronic mail, Internet-based “chatrooms,” and asynchronous Web conferences. These may be used to support student project teams, whether or not the team is part of a class that is offered totally as distance learning.

There are several companies that provide Internet-based classroom support. Using these online systems, classes may be totally Web-based, or may be traditional classes that use the Internet only for enhancements. One example is Blackboard®. An instructor can register and set up a course on Blackboard.com, and then post class documents, announcements, and other materials using this Web-based service. Within a course, the instructor can also create groups of students. Students can either schedule “chat” sessions, post asynchronous communications and documents, and/or use Blackboard®, to send each other e-mail with attachments. Students can use their “drop-box” to turn in assignments to the instructor, without the other students or other teams being able to access and see the documents.

Aside from services such as Blackboard®, universities can also set up remote access for faculty and students, so there can be individual and/or team access to CASE tools on a university server.

But is technology enough? Obviously, from Table 5, we see that many changes must take place for virtual teams to become effective. The instructor must see that those changes are made so that the technology can enable or support the forming, building, and managing of effective team projects.

Trust among members of a team is very important. Coutu (1998) cites studies that indicate that virtual teams do not develop trust in the same patterns that face-to-face teams do. With virtual teams, the trust factor must be established immediately, rather than developing slowly. The interactions between virtual team members must begin immediately, and they must begin

*Table 6: Strategies for Effective Virtual Teams**

<ul style="list-style-type: none"> • Make whole visible to everyone • Provide “line of sight” • Catalyze rich conversations • Amplify energy • Create tracks and footprints in physical space <p>* From Kimball, 2000.</p>

with social messages, introducing themselves to the others. Since there may not be body language nor voice tones and inflections to give members clues to one another, initial messages must be more personally informative.

In addition, the researchers stated that following the initial personal messages, there is a need to “set clear roles for each team member” (Coutu, 1998, p. 20ff). This allows each team member to know who to contact for a certain activity, and what will be expected of them by the other team members.

In a speech given at a Team Strategies Conference sponsored by Federated Press, Toronto, Canada, Kimball (1997) describes several strategies that “make a significant difference in team effectiveness. These strategies are listed in Table 6.

The ideas of *wholeness* and *visibility* are critical. The team must somehow *feel* like a team, rather than separate individuals. She suggests that the team brainstorm on ways to create this “wholeness.” The brainstorming idea itself will make members aware of the importance of thinking as a team, rather than individuals. Suggestions that have been made include posting a team photograph by each member’s computer, like on a mouse pad or a calendar, creating and distributing a map of where group members are, or creating a graphic that has meaning to the group.

The idea of *lines of sight* is to encourage group communications that can, somewhat, replace face-to-face group meetings. When a group has face-to-face meetings, there will usually be verbal reports, written reports, and minutes of the meeting. Again, Kimball suggests having the group brainstorm about how they can create substitutes for these lines of sight using modern technology.

Similarly, Kimball suggests brainstorming on ways that the group can *enrich conversations* with graphics, models, pictures, etc. Attention must also be given to ways the group can maintain and *amplify energy*, so the group spirit and enthusiasm don’t die down. She also notes that there must be a formal way to *create tracks and footprints in physical space*. How will records be kept? Who will keep the records? In what form? Using the team name, team logo, and other items created in early assignments will be constant reminders that the work is to be teamwork, rather than work done by a group of individuals.

CONCLUSION

Learning how to build, manage, and participate in teams is a very important success factor in careers in developing information systems. If instructors in these disciplines are to prepare students for their careers, there must be a conscious effort to have students both informed and experienced in

working in teams. As cited in the introduction, Van Slyke, Trimmer, and Kittner (1999) found that students do, indeed, benefit from training in teamwork. They conclude saying,

Many IS programs have responded [to employers] by integrating team projects into their curriculum. However, it may not be enough to simply throw students together and expect them to function effectively as a team. Specific training in teamwork skills may be a necessary component for successfully enabling students to be effective team members (p. 44).

Finally, a few other points should be made. First of all, remember that an important part of team building and team management is socializing. Socializing helps build communication, trust, and commitment. At various times during a project, it is important to take time out to celebrate and feel good about the teamwork and the job. Students should not be discouraged from having a good time while they are working on team projects.

And, although this chapter emphasizes the skills and techniques that encourage successful teams and team projects, the instructor must remain aware of the main subject matter of his/her course. The students need to learn the theory, concepts, and methodologies of systems analysis and design and/or programming. Most of the suggestions in this chapter take very little classroom time. Only a total of about two to three class hours, at most, need be spent directly on teaching teamwork. But those hours can provide both the student and the instructor with a lot of payback, in terms of student learning and successful team projects.

REFERENCES

- Alessandra, T., and O'Connor, M. J. (1994). *Behavioral Profiles: Self-Assessment*. San Diego: Pfeiffer & Company.
- Baughner, D., Varanelli, Jr, A., and Weisbord, E. (2000). Gender and culture diversity occurring in self-formed work groups. *Journal of Managerial Issues*, 12(4), 391-402.
- Berger, M. (1996). *Cross-Cultural Team Building: Guidelines for More Effective Communication and Negotiation*. London: The McGraw-Hill Companies.
- Breslow, L. (1998). Teaching teamwork skills. *Teach Talk Articles in the Faculty Newsletter* X(4). [Online]. Available: <http://web.mit.edu/tll/published/teamwork1.htm>.
- Breslow, L. (1998). Teaching teamwork skills, part 2. *Teach Talk Articles in the Faculty Newsletter* X(5). [Online]. Available: <http://web.mit.edu/tll/published/teamwork2.htm>.

- Brooks, F. P., Jr. (1995). *The Mythical Man-Month: Essays on Software Engineering* (20th anniversary edition). Reading, MA: Addison-Wesley.
- Constantine, L. L. (1993). Work organization: Paradigms for project management and organization. *Communications of the ACM*, 36(10), 35 - 43.
- Coutu, D. L. (1998). Trust in virtual teams. *Harvard Business Review*, 76(3), 20-21.
- Dodd, C. H. (1991). *Dynamics of Intercultural Communication* (3rd edition). Dubuque, IA: William C. Brown Publishers.
- Gardner, B. S., and Korth, S. J. (1999). A framework for learning to work in teams. *Journal of Education for Business*, 74(1), 28-33.
- Granrose, C. S., and Oskamp, S. (Eds.) (1997). *Cross-Cultural Work Groups*. Thousand Oaks, CA: Sage.
- Harper, L.F., and Rifkind, L. J. (1995). *Cultural Collision: Quality Teamwork in the Diverse Workplace*. Dubuque, IA: Kendall/Hunt Publishing Company.
- Hoffer, J.A. et al. (1999). *Modern Systems Analysis and Design* (2nd edition). Reading, MA: Addison-Wesley.
- Howard, S. A. (1998). Guiding collaborative teamwork in the classroom. *Effective Teaching*, 3(1). [Online] Available: <http://cte.uncwil.edu/et/articles.htm>
- Kagan, S. (1995). Group grades miss the mark. *Educational Leadership*, 52(8), 68-71.
- Katzenbach, J. R., and Smith, D. K. (1993). *The Wisdom of Teams: Creating the High-Performance Organization*. New York: Harper Business.
- Kimball, L. (1999). Managing virtual teams. (Text of speech given for Team Strategies Conference sponsored by Federated Press, Toronto, Canada, 1997.) [Online]. Available: <http://www.tmn.com/~lisa/vteams-toronto.htm>.
- Kimball, L. (2000). *Ten Key Elements for Team Leaders to Manage*. [Online] Available: <http://www.caucus.com/pw-tenkey.html>.
- Lankard, B. A. (1994). Cultural diversity and teamwork. *ERIC Digest No. 152*. ERIC Identifier: ED377311, 1994-00-00. [On-line] Available: http://www.ed.gov/databases/ERIC_Digests/ed377311.html.
- Larson, C. E. and LaFasto, F. M. J. (1989). *Teamwork: What Must Go Right/What Can Go Wrong*. Newbury Park, CA: Sage Publications, Inc.
- Lewis, J. P. (1993). *How to Build and Manage a Winning Project Team*. New York: American Management Association.
- Lipnack, J., and Stamps, J. (1997). *Virtual Teams: Reaching Across Space, Time, and Organizations with Technology*. New York: John Wiley & Sons, Inc.
- Marble, R. (1992). *Casebook for Systems Analysis and Design: F.S.S., Inc.* New York: Mitchell McGraw-Hill.
- Marble, R. (1993). *Casebook for Systems Analysis and Design: J.P.S., Inc.*

- New York: Mitchell McGraw-Hill,
- Mills, H. D. (1970). *Chief Programmer Teams: Techniques and Procedures*. IBM Internal Report, January.
- Montebello, A. R. *Work Teams That Work: Skills for Managing Across the Organization*. Minneapolis, MN: Best Sellers Publishing, 1994.
- Parker, G. M. (1990). *Team Players and Teamwork: The New Competitive Business Strategy*. San Francisco: Jossey-Bass Publishers.
- Robbins, S. P. and Hunsaker, P. L. (1996). *Training in Inter-personal Skills: Tips for Managing People at Work*. Upper Saddle River, NJ: Prentice Hall.
- Robbins, T.L. and Fredendall, L. D. (2001). Correlates of team success in higher education. *The Journal of Social Psychology*, 141(1), 135.
- Skopec, E. and Smith, D. M. (1997). *The Practical Executive and Team Building*. Lincolnwood, IL: NTC Business Books.
- Thomsett, R. (1980). *People & Project Management*. Englewood Cliffs, NJ: Yourdon Press.
- Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological Bulletin* 63(6), 384-399.
- Van Slyke, C., Trimmer, K., and Kittner, M. (1999). Teaching Teamwork in Information Systems Courses. *Journal of Information Systems Education*, 10 (3&4), 36-45.
- Weinberg, G.M. (1971). *The Psychology of Computer Programming*. New York: Dorset House Publishing.
- Weinberg, G.M. (1998). *The Psychology of Computer Programming* (Silver anniversary edition). New York: Dorset House Publishing.
- Wells, C.E. (1999). A team building and communications exercise for the systems analysis and design class. In Reither, B. J. (Ed.), *Proceedings of the Decision Sciences Institute Southwest Region*, March 10-13, pp. 129-131.
- Wheelan, S. A. (1999). *Creating Effective Teams: A Guide for Members and Leaders*. Thousand Oaks, CA: Sage Publications.
- Yamane, D. (1996). Collaboration and its discontents: Steps toward overcoming barriers to successful group projects. *Teaching Sociology*, 24(October), 378-383.
- Young, C. B., and Henquinet, J. A. (2000). A conceptual framework for designing group projects. *Journal of Education for Business*, 76(1), 56-68.