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Turning Student Groups into Effective Teams

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This paper is a guide to the effective design and management of team assignments in a college classroom where little class time is available for instruction on teaming skills. Topics discussed include forming teams, helping them become effective, and using peer ratings to adjust team grades for individual performance. A Frequently Asked Questions section offers suggestions for dealing with several problems that commonly arise with student teams, and forms and handouts are provided to assist in team formation and management.

I. Introduction

The benefits of collaborative learning have been demonstrated in countless studies and several meta-analyses (Johnson, Johnson, & Stanne, 2000; Springer, Stanne, & Donovan, 1997; Terenzini, Cabrera, Colbeck, Parente, & Bjorkland, 2001). Compared to students taught traditionally, students taught in a manner that incorporates small-group learning achieve higher grades, learn at a deeper level, retain information longer, are less likely to drop out of school, acquire greater communication and teamwork skills, and gain a better understanding of the environment in which they will be working as professionals.

These benefits are not automatic, however. Being part of an ineffective or dysfunctional team may well be inferior to independent study in promoting learning and can lead to extreme frustration and resentment. Students are not born with the project management, time management, conflict resolution, and communication skills required for high performance teamwork. If team assignments are to be given, explicit steps should be taken to help students learn those skills and to equip them to deal effectively with the logistical and interpersonal problems that commonly arise in collaborative efforts.

An instructor attempting to find a concise guide on how to work with teams in the classroom may find it difficult to gain a toehold in the literature. Many papers contain useful ideas on some specific aspect of teamwork, such as team evaluation or assigning team roles to students, but they describe only part of what an instructor needs to know to create an effective classroom team structure. There are excellent books on teamwork and project management (Garmston & Wellman, 1999; Stein & Hurd, 2000), but they generally present so much material that an instructor is left without a clear picture of where to start and how to prioritize the formidable array of suggestions. Other, briefer texts are intended for use as supplemental resources for team

members rather than as guides for instructors (Dufrene & Lehman, 2002; Smith 2000; Strbiak & Paul, 1998).

This paper presents a brief instructor's guide to managing team assignments when little class time can be devoted to providing explicit instruction in teamwork skills. Section II describes a simple but effective approach to team formation and offers suggestions regarding optimal team size, criteria to use when forming teams, and procedures for dissolving and reforming teams. Section III deals with ways to help student groups learn to function effectively in teams, including setting guidelines for team functioning, having the students establish common expectations of one another, and presenting strategies for avoiding problems with team functioning and dealing with problems that occur. Section IV describes a peer rating system for teams and a procedure for using the ratings to adjust group grades for individual performance. Section V offers answers to several frequently asked questions about team formation and management, and Section VI summarizes the main ideas of the paper. Forms and handouts to assist in implementing the team formation and management procedures described in the paper are reproduced in the Appendix and are listed in Table 1. The forms are also available through the New Forums website at http://www.newforums.com.

Throughout the paper, we will presume that the assignments to be worked on by student teams involve considerable time and effort, and that the teams will remain together for a significant portion of the course or all of it. The suggested procedures are generally neither necessary nor appropriate for brief in-class group activities, which require a great deal less structure and formality to be effective. The suggestions are based in part on the cooperative and collaborative learning literature (Abrami et al., 1995; Feichtner & Davis, 1991; Felder & Brent, 1994, 1996, 2001; Johnson, Johnson, & Smith, 1998; Kagan, 1992; Millis & Cottell, 1998; Obaya, 1999; Sharon & Sharon, 1976; Shaw, 1983) and in part on our own classroom experience. In most cases we are of a single mind about the recommendations but in a few we have different points of view. In the latter cases we will state the alternative positions and leave the reader to choose the one that best fits his or her teaching philosophy.

Table 1: Forms to Use in Working with Teams

Form	When Used	Objective
Getting to Know You	First day of class	Divide students into teams
Team Policies	First day of class	Define rules and procedures for teamwork
Student Expectations Assignment	First week of class	Develop a team contract
Coping with Hitchhikers and Couch Potatoes on Teams	First week of class	Deal with dysfunctional teams
Evaluation of Progress Toward Effective Team Functioning	1/3 through semester, 2/3 through semester	Identify team problems
Team Member Evaluation	2nd or 3rd week, mid-semester, end of semester†	Peer rating
Peer Rating of Team Members	Mid-semester, end of semester†	Peer rating
Auto rating Spreadsheet	Mid-semester, end of semester††	Use peer ratings to adjust team grades for individual effort

†The first administration is a 'trial run'—the forms are filled out and shared among the team members but not collected by the instructor.. ††This form is not given to students.

II. Forming Teams

A. Instructor-formed teams vs. self-selection

Instructors should form teams rather than allowing students to self-select. Left to their own devices, the stronger students in the class will tend to seek one another out, leaving the weaker ones to shift for themselves, which works to no one's benefit. Groups containing all weak students are likely to flounder aimlessly or reinforce one another's misconceptions, while groups composed entirely of strong students often adopt a divide and conquer policy, parceling out and completing different parts of the assignment individually and putting the products together without discussion. The depth of understanding and development of teamwork skills that result from generating and comparing alternative solutions and resolving conflicts is thereby lost. In well-functioning diverse groups, the weak students get the benefit of seeing how good students approach assignments and they may also get some individual tutoring, while the strong students who do the tutoring may benefit even more. Most teachers would support from their own experience the observation of Tryon Edwards that "Thoroughly to teach another is the best way to learn for yourself."

Most current research supports instructor-formed teams (Fiechtner & Davis, 1992; Obaya, 1999), although some authors disagree (Bacon, Stewart, & Silver, 1999). In one study, 155 students found by a two-to-one ratio that their worst group work experiences were with self-formed groups and their best with instructor-formed groups (Fiechtner & Davis, 1985). Our experiences echo those findings—we have found problems with interaction between team members to be reduced when self-selection is not allowed. Moreover, our personal experience is that self-selected groups may have a higher propensity for cheating, because pre-existing relationships between students with a common corner-cutting mindset can reinforce the belief within a group that "it's okay—everybody does it." A tightly knit group of friends is more likely to incline toward covering for one another rather than informing on infractions such as plagiarism or failure to participate in group efforts.

When students are told they will be working in groups in courses in which group work is not traditional, some may immediately object strenuously. Others will submit requests to work with their friends, relatives, roommates, or athletic teammates, and will join the chorus of objectors when they are informed that their requests will not be honored. It is important to deal with these issues early before a wall goes up between the instructor and the class that may be difficult to breach later.

On the first day of class, after announcing the group work requirement and noting that we will form the teams, we acknowledge to the students that some of them may be unhappy about this policy. We then explain that when they join a company, they will not be asked whether they prefer to work alone or with others, and they will not be presented with a list of all the employees and asked who they'd like to work with. What *will* happen is that they will be assigned to groups of coworkers by their supervisor, and their job performance rating may depend more on how well they're able to work with those people than on any other ability they may have. We conclude by telling them that since that's what they'll be doing in their careers, they may as well start learning how to do it now. They still may not like it, but most will understand the logic of the argument and go along with it with minimal complaining. For more information about dealing with student resistance to cooperative learning and other student-centered instructional techniques, see Felder & Brent (1996).

B. Criteria for team formation

We propose forming three- to four-person teams for most assignments, attempting to observe the following two guidelines to the greatest extent possible (Felder & Brent, 1994; Felder & Brent, 2001):

1. Form teams whose members are diverse in ability levels and who have common blocks of time to meet outside class.
2. In the first two years of a curriculum, avoid isolating at-risk minority students on teams.

There is no consensus in the literature on the optimal team size, but most authors agree that the minimum for most team assignments is three and the maxi-

mum is five. (There are obvious exceptions to these rules, such as laboratories with two-person work stations.) With only two people on a team, there may not be a sufficient variety of ideas, skills, and approaches to problem solving for the full benefits of group work to be realized. Also, conflict resolution can be problematic in a pair: whether right or wrong, the dominant partner will win most arguments. On the other hand, if a team has more than five members, at least one is likely to be relatively passive unless the project is a large one that has six or more distinct roles, which few team assignments do. Many cooperative learning authorities believe that five-member teams are likely to experience the same problem. Our recommendation is therefore to form three- and four-person teams, making more of them teams of four if early dropouts are common in the course.

In the preceding section we offered the rationale for ability heterogeneity in teams: essentially, it is to provide weak students with good modeling of effective learning approaches and perhaps tutoring from strong students, provide strong students with the learning benefits that come from teaching others, and avoid the unfairness of allowing strong students to cluster together and the poor learning environment likely to exist in teams of all weak students. The desirability of forming teams whose members have common blocks of time outside class is self-evident, especially if many of the students commute to campus or have outside jobs that require extensive time commitments.

The second suggested guideline requires explanation. Some ethnic minorities are at a relatively high risk for dropping out of college, and women are at higher risk than men for doing so in certain curricula (notably, engineering), with most dropouts occurring in the first two years of the curriculum (Seymour & Hewitt, 1997). Studies have shown that when members of at-risk minority groups are isolated in project teams, they tend either to adopt relatively passive roles within the team or are relegated to such roles, thereby losing many of the benefits of the team interactivity (Heller & Hollabaugh, 1992; Widnall, 1988). The isolation these individuals feel within their teams could also contribute to a broader sense of isolation in the student body at large, which may in turn increase the dropout risk. Since women constitute an at-risk minority in engineering, in freshman and sophomore engineering courses we therefore recommend forming teams with all men, all women, two of each, or two or three women and one man, but not two or three men and one woman. The same rule would be applied to at-risk ethnic minorities. (Some authors recommend avoiding homogeneous teams in race or gender, but in classes where the majority students heavily outnumber the minorities it is not possible to avoid them.)

Once the students enter the third year of the curriculum, the risk of dropping out becomes minimal and the focus of the curriculum should change from reducing attrition to preparing students for the workplace. On the job, no one is going to make sure that women and minorities are not isolated in groups, and so part of their education should be learning to work in such environments. For this reason, we abandon the non-isolation rule starting in the third year.

C. Collecting the data needed to form teams

The information needed to form teams may be obtained by having all students fill out the *Getting to Know You* form (Appendix) on the first day of class. This form provides information related to ability levels and times available to meet outside class (Felder & Brent, 1994; Felder & Brent, 2001). Grades in prerequisite courses are a good measure of ability, since many of the same skills are likely to be required in the prerequisite(s) and the current course. From a student's perspective, checking the prerequisites (as opposed to, say, asking for an overall GPA) is a natural thing for the instructor to do at the beginning of a course. The few students who do not elect to provide their grade on the form are distributed randomly among the teams. One of us also includes questions about gender and ethnicity on the form, with a statement that the student may choose not to answer these questions. (Almost everyone answers them, but their optional nature should be made explicit.)

The forms are distributed, filled out, collected on the first day of class, and shuffled into teams using the three criteria of ability heterogeneity, common blocks of time outside class, and (if the questions about gender and ethnicity were included) non-isolation of at-

risk minorities in the first two years of the curriculum. The process is generally much more efficient than most instructors fear before they have tried it. One of us has taught classes of 120 and more for many years using this technique, and can always form teams in two hours or less. The team compositions can then be announced on the second day of class.

The *Getting to Know You* form serves other purposes as well. As students fill it out, they are often pleasantly surprised to find that the instructor is interested in them personally—in their hobbies and favorite movies, for example. In smaller classes, one of us likes to ask students to briefly introduce themselves, referring to the form if they wish (which makes the task much less intimidating to students who are terrified about speaking in public). This technique helps convert the class into a learning community.

D. Dissolving and re-forming teams

At the beginning of all courses except those that involve semester-long projects, we announce that we will dissolve the teams after 4–6 weeks and form new ones *unless* we get individual signed requests to stay together from all members of a team, in which case that team may remain intact. Our experience is that the overwhelming majority of the teams elect to stay together. The only ones that do not are those that are painfully dysfunctional, often because of uncooperative or domineering members. The latter individuals usually had such a bad experience with their first teams that they get their acts together on their new teams, and those teams function well. If it turns out that only one team elects to dissolve, its members are distributed among existing teams of three. We do not recommend allowing groups to re-form more than once in a semester or quarter. Frequent changes create logistical problems with grading, and they may keep the students from developing a team dynamic and learning to resolve the interpersonal problems that almost inevitably arise in group work (Bacon et al., 1999).

When we re-form teams, we make some exceptions to our ban on student selection of teammates. First, we allow students on the disbanded teams to specify whom they absolutely do not want to work with again and we honor those requests. In addition, if some members of a dissolved team want to stay together, and it doesn't compromise our ability to distribute the other students in a fair way, we let them.

III. Converting groups into effective teams

A group of students coming together to work on an assignment is not the same thing as a well-functioning team. The students in any given group may sometimes work together, but they may also be inclined to work independently, simply pooling their work with no discussion, and they may spend a great deal of time in conflict over work-related or personal issues. In contrast, members of an effective team always work together—sometimes physically together and sometimes apart, but constantly aware of who is doing what. They take different roles and responsibilities, help one another to the greatest possible extent, resolve disagreements amicably, and keep personal issues (which may occur when any collection of people work together) from interfering with the team functioning. With a group, the whole is often equal to or less than the sum of its parts; with a team, the whole is always greater. In survey after survey of employers, teamwork skills (along with communication skills) are at the top of the list of attributes they would like to see more of in their new hires. This section suggests several methods for equipping students with those skills.

A. Establishing expectations

Two important first steps in turning groups into effective teams are to set out a clear set of guidelines for team functioning and to have the members formulate a common set of expectations of one another. Two forms in the appendix may be used to facilitate this process: the *Team Policies Statement* and the *Team Expectations Agreement*. The policy statement provides guidance on effective team functioning, outlining different team roles and the responsibilities that go with each role, procedures for working on and submitting assignments, and strategies for dealing with uncooperative team members. The *Team Expectations Agreement* serves two purposes: it unites the team with a common set of realistic expectations that the members generate and agree to honor, and it also serves as a "quasi-

legal document" to prevent students from making invalid claims about what they were supposed to do. [Research has shown that commitments made in public are less likely to be violated (Salacik & Pfeffer, 1978)]. Both of these forms are given out on the first day of class, with a copy of the completed and signed Team Expectations Agreement due back to the instructor within a week. The instructor keeps file copies of the completed agreement for reference in the event of problems arising later in the course, and some instructors hand back copies after about three weeks (by which time problems generally start to surface) as reminders to the students of what they had agreed to do.

The Team Policies Statement in the Appendix is not intended to be copied and handed out verbatim; rather, it may be used as a starting point for instructors to formulate their own rules and guidelines. In particular, certain types of courses may require another set of team roles in addition to the functional roles of coordinator, checker, recorder, and monitor. In a lab course, for example, different students may be called on to take principal responsibility for experimental design, equipment calibration and operation, data recording and processing (including error analysis), and theory-based interpretation of results, and analogous classifications may be constructed for project-based courses including engineering design. These roles should also be spelled out in the Policy Statement. The Statement should also be considered a living document rather than something etched in stone. Each time you teach a course, make notes of things you wish you had inserted or changes you think would make the statement more effective, and incorporate those changes before you teach your next course.

Another measure that helps build team coherence early is to have the members agree on a team name—perhaps one that reflects their common interests (Millis & Cottell, 1998). Both the students and you will enjoy some of the creativity that this task frequently inspires. You may or may not tell them that the name has to be within the bounds of good taste, depending on how you feel about undergraduate humor.

B. Preliminary instruction on effective team practices

Students are not born knowing how to work in teams, and new assignment or project groups frequently make common mistakes that limit their effectiveness. While some instructors begin classes with extensive instruction on teaming skills and team-building exercises, our preference is to provide a few precautionary notes initially and then to provide guidance on dealing with problems once the problems have begun to surface, when the guidance is likely to have a much greater impact.

Following are several things we tell students early in the course in an effort to keep them from making some of the most common teaming mistakes.

- *As you'll see in the Team Policy Statement, you will have assigned roles in your teams (coordinator, recorder, checker, etc.) that rotate among the members. You may be inclined to ignore these role assignments and just do the work in any way that comes to mind, or maybe one team member will actually do the coordinating all semester no matter who is supposed to be doing it for a given assignment. That's a mistake. We strongly advise you to take the roles seriously—your work will go more smoothly and turn out better if you do. Also, the roles each involve different skills, all of which you'll need to function effectively as professionals. Now is the time to start picking up those skills—and you can't do it if you never take on the roles.*

- *Some teams like to divide and conquer, parceling out different parts of the assignment, completing them individually, and stapling the different parts together and handing them in (perhaps after first recopying them in a single handwriting to make it look more like a unified effort). Don't do it! On tests and/or when you report on your work, you will be examined individually on every aspect of the assignment, and your grade will depend in part on how well you understand both the part that you mainly did and all the other parts. Before you hand anything in, go over it in detail and make sure you're ready for that examination.*

One more tip is particularly important for team assignments that involve quantitative problem-solving.

- *A common mistake is for teams to sit around a table and solve all problems together. What usually happens is that someone on the team is faster than the others, and that one will begin every problem solution. If you happen to be in the slower category, you may have to figure out how to approach such problems for the first time on the tests, which is not when you want to do it. A better approach is for every team member to outline the solutions individually, and then get together to work out the details.*

We give these little sermons when students first begin to work in teams, and then give them again as reminders after the results from the first test are in, when some unfortunate students who didn't believe the warnings learn the lessons the hard way. We may also require students to hand in their outlines for the first few assignments. We don't grade them, but we deduct points from students who fail to turn them in.

C. Dealing with problem team members

It is a rare student team that doesn't eventually run into problems with one or more of its members. The most common problems involve team members who refuse to do their share of the work but try to get the same grades as their more responsible teammates (aka hitchhikers); domineering team members who try to coerce the others into doing everything their way; resistant team members who resent having to work in a team and refuse to participate or in other ways try to sabotage the team effort; and team members with widely divergent goals—some wanting an A no matter what it takes, others wanting to do just enough to get a C.

Early in the course we hand out a copy of *Coping with Hitchhikers and Couch Potatoes on Teams* (Appendix), and ask the students to write and turn in a half page essay on how they feel the *Hitchhiker* paper applies to their past or present experiences (Oakley, 2002). Writing the essay ensures that the students have actually read the handout and also helps them internalize what they have read. The essays are not graded.

The "Hitchhiker" essay has proved to be an effective tool for promoting healthy interactions within groups. Good group dynamics do not entail some individuals serving as doormats, and this paper explicitly tells students that it's okay to assert their rights. Student written responses to the "Hitchhiker" essay vary widely, ranging from several scribbled sentences on a piece of scratch paper to typed, well-written, deeply insightful pieces several pages long. (Interestingly enough, probably the best predictor of a problematic team member is a sloppy and superficial response to this assignment.) A common written response in junior and senior level classes involves a brooding realization that the student had missed opportunities to take control in previous instances of mistreatment by classmates or coworkers.

Even with the forceful urging of the "Hitchhiker" essay and the dawning realization of the important part they themselves play in allowing themselves to be taken advantage of, students still usually allow hitchhikers and couch potatoes to get away with little work on their first joint assignment. However, by the second assignment, students generally begin to take tentative steps towards confronting non-contributors. Problem mini-clinics (described below) can provide valuable support at this point. Contributing students need to know that their professor is an ally who will back them up if they take the uncomfortable step of confronting their fellow students, even if the confrontation simply consists of not putting a name on an assignment.

Several elements of the *Team Policies Statement* give students tools for dealing with problematic team members. The students are told that if a team member is not involved substantively in the work, his or her name should not go on the completed assignment. We also empower the students by allowing them to fire a non-participating team member, and we allow students who are repeatedly forced to do most of the work themselves to switch to a different team (Strong & Anderson, 1999).

Neither firing nor quitting can occur simply because students decide to do it, however. A team contemplating firing someone or an individual contemplating resigning has to meet with the instructor first—along with the miscreant in the first case or the rest of the team in the second, if they are willing to come. At the meeting, we introduce the students to active listening, in which each side makes its case and the other side has to repeat the case in its entirety to the first side's satisfaction without reacting to it. (Very often the prob-

lem almost resolves itself once each side can articulate the other side's case.) Then we talk about what happens next, including the possibility of firing. If and when these measures fail to resolve the problem, the problem student's team or the student intending to quit may send a memo warning of their intention, with a copy going to the instructor. If a week goes by with no improvement, the memo announcing the firing or quitting may be sent, again with a copy to the instructor. It almost never happens—usually teams work things out, with or without the instructor's help.

Firing could have major consequences: one of us requires the fired student to find a team of three willing to take him/her on as a fourth or get zeros on team assignments for the rest of the semester, and another has the fired student working alone for the rest of the semester. In any case, with student lawsuits becoming increasingly common, it is critically important to put policies about firing in writing and for all students to be aware of them at the outset of the course.

Several weeks into the course, interpersonal problems inevitably begin to surface. We recommend several techniques for helping students learn to confront and resolve these problems.

- *Hand out* Evaluation of Progress toward Effective Team Functioning *(Appendix) several times during the semester to get students to reflect on how their team is doing.* Students are inclined to sweep problems under the rug until the problems become severe enough to cause explosions. Periodic reviews of what is going well and what needs work can get the problems on the table where they can be dealt with in a less emotional and more constructive manner. Again, other than handing out, collecting, and keeping the evaluations on file, the instructor normally would not comment or take action in response to them unless they suggest that an explosion is imminent (and perhaps not even then).
- *When students start complaining about hitchhikers or otherwise non-cooperative team members, remind the class about the measures for dealing with these situations in the* Team Policies Statement. You might add that if a student is not cooperating and they continue to put his or her name on the completed assignments, they have no basis for complaining.
- *Run periodic 10-minute "crisis clinics."* A quick scan of the results from the *Evaluation of Progress toward Effective Team Functioning* form can provide clues about which problems might be worth discussing in these sessions. In a clinic, raise a specific issue, such as the hitchhiker, and put the students in groups to brainstorm different strategies that might be used to deal with it. Any strategy is fair game in these brainstorms—good ones, bad ones, even illegal ones (the frustration and latent hostility implied by some of the illegal responses can be eye-openers for the hitchhikers). You may also throw in a suggestion or two. List the ideas on the board and have the groups decide on the best first response, the best second response if the first response doesn't get the desired results, and the best last-resort response. Collect and list these responses, and then begin or resume the regular class. The students will leave with excellent strategies that they generated themselves, and the hitchhikers will be put on notice that they could be in trouble if they don't shape up. One or two weeks later, you might take up the overly dominant team member (or whoever the troublemaker *du jour* might be) in a similar exercise.

Students often have strong inhibitions against speaking out about problems, or they may simply wish to avoid unpleasantness. The crisis clinics provide a relatively comfortable forum for bringing problems up, and they clearly convey the message that the students have both the responsibility and the means to deal with the problems themselves, as opposed to either ignoring them or looking to the instructor to solve them. In our experience, roughly one group in ten has problems severe enough to compel team members to initiate discussions with the instructor. Most of those cases involve either a hitchhiker or a good student who feels (usually rightly) that he or she is doing most of the work. Most of these problems are resolved through active listening, and very rarely they end with a student either quitting or being fired.

We have observed that when these techniques and those described in the next section are implemented, some problem students drop the class early—perhaps out of an awareness that they cannot slide through the

system in ways that may have worked for them before. Most of those who stay in the course become more responsible once they realize that their grade is likely to be affected by their actions (or inactions). In a small number of cases, the seeds of personal responsibility only take root after the worst has happened. One of us has had the gratifying experience of having a former student appearing several years after being fired and thanking us for the wake-up call, which apparently made a difference in his life.

IV. Peer Ratings and How to Use Them

Peer ratings are an effective device for improving team performance, helping students develop teamwork skills, and adjusting team grades for individual performance (Brown, 1995; Harkins & Jackson, 1985; Kaufman, Felder, & Fuller, 2000). As Millis and Cottell put it, "[Students] may be able to 'psyche out' a teacher, but they can rarely hide from their peers." (Millis & Cottell, 1998) Kaufman et al. (2000) note, "Some instructors who do not adjust team grades for individual performance argue that they are only simulating the work environment, but they are incorrect. In the professional world, individuals who do not pull their weight on work teams eventually suffer consequences far worse than low grades."

There are two alternative approaches to using peer ratings as a basis for team assignment grade adjustment. The first one calls on the students to assess the relative contributions of the team members to the final product, usually expressing them as percentages of the total effort, and the second calls on them to assess the "team citizenship" of each member (cooperating with the team, fulfilling responsibilities, helping others when possible, etc.). In both approaches, the team grade is weighted by the average rating a team member receives to determine his or her individual grade.

We recommend the second approach (assessing team citizenship). The first one (assessing relative contributions) is intrinsically competitive and favors the team members who are academically strongest, who almost inevitably make the greatest contributions to the final team product and who are also favored on examinations and other course assessments. If the weaker students on a team know that no matter how hard they try, their assignment grade will be lowered by the presence of stronger students on the team, many will be discouraged and/or resentful (rightly so) of the system putting them in that position. The second approach stresses teamwork skills over academic ability. If all team members act responsibly and cooperatively, they will all receive the team assignment grade; the only ones penalized by the system will be the hitchhikers and the other problem team members discussed earlier in this paper.

If peer ratings are to have any reliability and validity, however, some guidance must be provided to the team members on how to assign them. An excellent computer-based system for providing such guidance and carrying out the evaluation for primarily formative purposes is the *Team Developer* (McGourty & De Meuse, 2001). This workbook/electronic system also offers suggestions to students and instructors on such things as how to get groups with differing motives, interests, and personalities to work together; how to conduct group meetings; how to keep someone from dominating the team; and how to get quiet types to contribute their thoughts and ideas.

We have made extensive use of a simpler yet nonetheless effective peer rating system, which is based on an autorating system developed by Rob Brown of the Royal Melbourne Institute of Technology (Brown, 1995) and modified by Kaufman, Felder, and Fuller (2000).

- *After the first few weeks of class, have the students fill out* Team Member Evaluation forms *(Appendix) for each team member (including themselves) and discuss them with one another.*

This rubric lists the attributes of good teamwork that the instructor wishes the students to use as the basis of assigning ratings and has the students assign Likert scores[1] for each attribute to all team members, with one form completed for each individual. The attributes listed in the Appendix are the ones that we use; possibilities

[1] Ratings of the level of agreement or disagreement with an item (1 = disagree strongly, …., 5 = agree strongly), or the frequency with which the indicated action is accomplished (1 = never, 2 = sometimes…, 5 = always).

for others are suggested by McGourty and De Meuse (McGourty & De Meuse, 2001). Taking the attribute ratings into account, the students assign overall verbal ratings from a list that ranges from "excellent" to "no show," and discuss their evaluations with one another at their next team meeting. The forms for this first round are not turned in to the instructor. This procedure gives the students a concrete understanding of the rating system that will later be used as the basis for determining individual grades for the team assignments.

An alternative to having the students fill out the forms and discuss the ratings is for them to fill out the forms anonymously and share them over the Web, using software designed for this purpose (McGourty & De Meuse, 2001). An advantage of this procedure is that the students would be more likely to express negative opinions honestly; a disadvantage is that a productive discussion of those opinions might be less likely to follow.

Before the students fill out the forms, spend a few minutes in class going over them, answering questions about them, and emphasizing the importance of honesty in completing them. Stress that it would be extremely unfair for them to gloss over the faults of, say, a team hitchhiker in these initial evaluations and then later seriously downrate that student for the same behavior when it can affect his or her grade.

- *At the end of the course and (optionally) midway through it, have the students complete the* Team Member Evaluation Form *again, summarize their verbal ratings on the* Peer Rating of Team Members Form *(Appendix), and submit the latter form into the instructor. A good idea is to have the students submit the forms in sealed envelopes, with the student team names or numbers on the outside—this makes it easy to sort the forms for each group.*

If the mid-term form is collected, the ratings are used in a manner to be described to make individual adjustments to the team assignment grades for the first half of the course and the final ratings are used for the second-half grades. This method is appropriate for courses in which assignments are collected and graded at regular intervals, e.g. weekly. The single end-of-semester rating is more suitable for project-based courses when only one grade is given. An advantage of the first method is that students who receive low ratings in the first set have a chance to mend their ways in the second half of the course. For this reason, in a single-project course it would be a good idea to conduct a second round of "practice" ratings roughly halfway through the semester or quarter.

- *Use the* autorating system *(Appendix) to convert the verbal ratings to numerical ones, calculate a weighting factor for each team member, and determine each student's individual grade as the product of the team assignment grade and the weighting factor for that student. This system is not shared with the students unless an individual student asks (in our experience, they almost never do).*

Kaufman, Felder, and Fuller (2000) discuss this system, illustrate its application to a 90-student engineering class, and determine the incidence of inflated self-ratings, apparent gender and racial bias, and other potential problems with peer ratings. They find that the system is reliable and almost problem-free. Even so, instructors should reserve the right to disregard any ratings that look suspicious after attempting to understand the dynamics that produced them. (One of us still remembers a failing student who gave himself an "excellent" while rating the other three hard-working members of his team "superficial.")

V. Frequently Asked Questions

- *I find that when I use cooperative learning, many students raise objections at first. Most of the complainers seem to become more accepting after the first few weeks of the course, but one or two continue to be upset about having to work in groups. Should I worry about them?*

Sure, but not too much. Students routinely find things they don't like in their education—exams, for example, or 8 a.m. classes—but their unhappiness imposes no obligation on us to change those things. Our job as instructors is not to make all of our students happy (although we would certainly prefer that they be) but to do all we can to help them learn and to assess their

mastery of the knowledge and skills we are trying to teach. If some students don't like something you're doing and you believe that whatever it is helps further your instructional mission, do your best to explain why you're doing it (see Section II-A) and then move on. You might also find it useful to conduct a mid-term course evaluation that includes student responses to the use of teams in the course. When the dissenters learn that they constitute a very small minority of the class, their opposition is likely to become far less vocal.

- *Some teams are not taking on their assigned roles (recorder, coordinator, checker, etc.) Instead, they either parcel the problems out so that each team member has to do only one-quarter of the work, or they alternate weeks—half the team does the problems one week, while the other half does them the next week. What should I do about this?*

If the students are only doing a fraction of the problems and the exams are written to cover all the material on the assignments, the students are likely to do poorly on the exams. If they are doing well, the exams may not require understanding of the full content of the assignments and future tests should be made more comprehensive. We recommend making sure the first exam in particular is comprehensive and (within reason) challenging. When the exam is graded, point out that saving time by not doing the homework and then failing the course is not such a good idea. After that, forget about it. The students who are not doing the work and failing are getting the grades they have earned, and if some students are able to do well on the exams despite not doing the homework, they're clearly learning the material, which is after all the point of the homework.

- *A student is on the swim team (which imposes a rigorous schedule) and wants to form a team of two with his friend, who is also on the swim team. Both refuse to be in a team of four because no one else would be able to accommodate their schedule, and besides, they claim to know a lot about working on teams because of their sports activities. Should I let them do it?*

If you've collected the forms and can verify that no one else has a compatible schedule, you might approve the exception, but not until then. You might also warn them that they could be making their lives more difficult by working in a pair on assignments designed for teams of three or four.

- *I work at a commuter school where many students also work part time. Some of my students turn in schedules indicating that they're unavailable nearly every hour of the week. It's nearly impossible to fit these people into a team with anyone else. Should I let them work alone?*

You have to be flexible in such cases—it is unreasonable to give students a forced choice between quitting their jobs or working around the clock to accommodate your class requirements. What you might do is let them work individually, pointing out that they will be at a disadvantage relative to students working in teams but acknowledging your awareness that they have lives to lead. You might also try to organize them into virtual groups whose members regularly compare answers by email or phone, and you could consider making yourself available to them in extra office hours on campus or virtual office hours. Several references offer suggestions about running effective virtual teams (Gibson & Cohen, 2003; Holton, 2001; McFadzean, 2001a, 2001b; McFadzean & McKenzie, 2001).

- *My class is usually in flux for the first two weeks with people adding and dropping. How do I form stable groups?*

You might randomly form practice groups, announcing that you'll form the permanent groups in two weeks, and give a quiz sometime in that two-week period. At the end of the two weeks, have students fill out the questionnaires. Form permanent groups based on the questionnaires, the quiz grades, and the grades in prerequisite courses.

- *My class has labs traditionally taught using teams of two because of space limitations around the computer station. Should I still try to force 3–4 person teams?*

In this case it makes sense to go with pairs, but use the pair programming approach that is becoming popular in computer science in which two programmers work side-by-side at one computer, collaborating on the same design, algorithm, code, or test (Williams, Kessler, Cunningham, & Jeffries, 2000). The person at the keyboard is the driver. The other is the navigator, who continuously observes the work of the driver—watching for defects, suggesting alternatives, seeking resources, and considering strategic implications of the work in progress. The roles are switched periodically. The other procedures detailed in this paper still apply.

- *Occasionally, students with a critical portion of an assignment to complete will suddenly drop the course, leaving their team members in the lurch. Should I extend the assignment due date for that team?*

We recommend doing so. In fact, we tend to grant almost all such requests as long as the reasons are legitimate. It costs nothing, and it builds good will among the students.

- *Although I try to persuade students that they should consider the team as their primary learning resource and come to me only when everyone is stuck on something, I still have students who come directly to me for help with practically everything. I don't want them to think that I'm unresponsive to their needs, but I also want them to get away from thinking of me as the one with all the answers. What should I do?*

An important function of cooperative learning is to reduce the common student attitude that the instructor is the only source of truth and wisdom. If you find several of your students laboring under this misperception, consider adding the "three before me" guideline (Kagan, 1992) to your Team Policies statement. Require the students to consult three different sources of information—other texts, teaching assistants, even other teams—and to document their efforts before coming to you.

- *What percentage of the students' final grade should be devoted to teamwork type activities?*

If homework is the only group activity, we recommend that 10-20% of the grade be team-related. If an additional project or series of labs are involved, another 10-20% could be added, for a total of 20-40%. If the entire course is project-based, perhaps as much as 80% of the grade can be based on the team product and presentation. In the latter case, however, it is particularly important to adjust the team grade for individual contributions as described in Section IV of this paper.

- *Occasionally, a student with failing test grades can pass my course because his or her overall grade is boosted by the team assignment grade. How should I handle this?*

In a course where most of the grade is determined by individual examinations, announce on the first day of class and put into your syllabus that team assignment grades will only count for students whose average grade on the individual tests is at or above the passing level. (This would not be an appropriate policy for a course in which most of the grade is determined by a team project.)

- *I've got a terrible team in my course—they're constantly arguing and complaining about one another. Is cooperative learning failing, or am I?*

Neither—in all likelihood, cooperative learning is working well and so are you. No instructional method comes with a 100% guarantee that it will always work well for all students: if some students fail a course, for example, it does not automatically mean that either the instruction or the instructor was deficient. If you have, say, 10 teams in your class and most of them are functioning well and most students are learning as much or more than they did when you taught traditionally and you have one dysfunctional team, congratulate yourself. That's good teaching.

- *I find that there are individual cases where one of my announced policies put several of the students at an unfair disadvantage, but I'm reluctant to make exceptions. Should I hold fast to the rules or deal with these cases individually?*

No rules, policies, or procedures should ever be allowed

to replace your judgment as a teacher. You should always feel free to change announced policies or grant exceptions to them, provided that the changes do not violate university policies and are not detrimental to the students. Such changes should be rare, however; if you find yourself having to make them frequently, it suggests that you may need to think through your policies a little more carefully before announcing and implementing them.

VI. Summary

Cooperative learning has been repeatedly shown to have strong positive effects on almost every conceivable learning outcome. Simply putting students in groups to work on assignments is not a sufficient condition for achieving these benefits, however. Unless the instructor takes steps to assure that the groups develop the attributes associated with high-performance teams, the group learning experience is likely to be ineffective and may be disastrous. This paper offers suggestions regarding those steps, of which the principal ones are these:

- Unless the class setting or the nature of the assignments dictates otherwise, use three- and four-person teams. Form the teams yourself, trying to make them heterogeneous in ability with common blocks of time to meet outside class. In the first two years of a curriculum, avoid isolating at-risk minorities on teams. The *Getting to Know You* form in the Appendix may be used to collect the information needed to form teams using these criteria.
- As soon as the teams are formed, establish the policies that will govern their operation and get them to formulate their own expectations of one another. The *Team Policies Statement* and the *Team Expectations Agreement* in the Appendix provide models for implementing this step. Let the students know about some of the mistakes new teams commonly make and suggest how they might avoid making them, giving them messages like those in Section II-B. Consider handing out *Coping with Hitchhikers and Couch Potatoes on Teams* (Appendix) and using it as a basis for discussing problem students and how to deal with them.
- As the course proceeds, periodically have the team members evaluate what they are doing well and what areas need work. The *Evaluation of Progress toward Effective Team Functioning* (Appendix) may be used for this purpose.
- Once interpersonal conflicts start to surface, remind the students of the options provided in the *Team Policies Statement* for dealing with them, including the last-resort options of firing and quitting. Run occasional crisis clinics to help students formulate their own procedures for dealing with common problems, using the format outlined in Section II-C.
- Unless a course involves a semester-long project and so requires that teams remain together, dissolve and reform the teams once midway through the semester, but allow teams that unanimously wish to stay together to do so.
- Use a peer rating system to assess the performance of individual team members and to adjust team grades to take the ratings into account. Be explicit about the criteria to be used in assigning ratings, and choose criteria that reflect responsibility and cooperativeness rather than academic ability. Systems such as *Team Developer* (McGourty & De Meuse, 2001) and the autorating system outlined in Section IV are effective for both individual grade adjustments and providing constructive feedback to students on their strengths and weaknesses as team members.
- Conduct a mid-term course evaluation, including in it a question regarding the students' attitudes toward teams. You will probably find that most of the students are either supportive of it or neutral, and the few (often vocal) dissenters will be put on notice that they constitute a small minority in the class.
- Do not be bound rigidly by any of the policies you formulate. Students have different circumstances, problems, and needs, and no rule can be made for which there are no reasonable exceptions. Trust your judgment, and don't hesitate to exercise it.

Based on both the literature of cooperative learning and our experience, the methods described in this paper help students enjoy grappling with the ideas and problems

the class presents, and they also develop a sense of community among the students that contributes to the departmental or school *esprit de corps*. The line of students outside the instructor's office door during office hours diminishes, and the questions asked during those office hours are better. Perhaps most importantly, the students develop a life skill vital to their future professional and personal development: the ability to interact in a positive and effective way with colleagues and coworkers.

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References

Abrami, P. C., Chambers, B., Poulsen, C., De Simone, C., D'Apollonia, S., & Howden, J. (1995). *Classroom Connections: Understanding and Using Cooperative Learning*. New York: Harcourt Brace & Company.

Bacon, D. R., Stewart, K. A., & Silver, W. S. (1999). Lessons from the best and worst student team experiences: How a teacher can make the difference. *Journal of Management Education, 23*(5), 467-488.

Brown, R. W. (1995). *Auto rating: Getting individual marks from team marks and enhancing teamwork.* Paper presented at the Frontiers in Education Conference, IEEE/ASEE, Pittsburgh.

Dufrene, D. D., & Lehman, C. M. (2002). *Building High-Performance Teams.* Cincinnati: South-Western, a division of Thomson Learning.

Felder, R. M., & Brent, R. (1994). *Cooperative Learning in Technical Courses: Procedures, Pitfalls, and Payoffs*: ERIC Document Reproduction Service, ED 377038, [Online]. Available: http://www.ncsu.edu/felder-public/Papers/Coopreport.html.

Felder, R. M., & Brent, R. (1996). Navigating the bumpy road to student-centered instruction. *College Teaching, 44*, 43-47, [Online]. Available: http://www.ncsu.edu/felder-public/Papers/Resist.html.

Felder, R. M., & Brent, R. (2001). Effective strategies for cooperative learning. *J. Cooperation & Collaboration in College Teaching, 10*(2), 69-75, [Online]. Available: http://www.ncsu.edu/felder-public/Papers/CLStrategies(JCCCT).pdf.

Fiechtner, S. B., & Davis, E. A. (1985). Why some groups fail: A survey of students' experiences with learning groups. *The Organizational Behavior Teaching Review, 9*(4), 75-88.

Fiechtner, S. B., & Davis, E. A. (1992). Why some groups fail: A survey of students' experiences with learning groups. In A. S. Goodsell, M. R. Maher & V. Tinto (Eds.), *Collaborative Learning: A Sourcebook for Higher Education*.: National Center on Postsecondary Teaching, Learning, & Assessment, Syracuse University.

Garmston, R., & Wellman, B. (1999). *The Adaptive School: A Sourcebook for Developing Collaborative Groups*. Norwood, Massachusetts: Christopher-Gordon Publishers, Inc.

Gibson, C. B., & Cohen, S. G. (2003). *Virtual Teams that Work : Creating Conditions for Virtual Team Effectiveness*. San Francisco: Jossey-Bass.

Harkins, S. G., & Jackson, J. (1985). The role of evaluation in eliminating social loafing. *Personality and Social Psychology Bulletin, 11*(4), 457-465.

Heller, P., & Hollabaugh, M. (1992). Teaching problem solving through cooperative grouping. Part 2: Designing problems and structuring groups. *Am. J. Phys., 60*(7), 637-644.

Holton, J. A. (2001). Building trust and collaboration in a virtual team. *Team Performance Management, 7*(3/4), 36-47.

Johnson, D. W., Johnson, R. T., & Smith, K. A. (1998). *Active learning: Cooperation in the college classroom* (2nd ed.). Edina, MN: Interaction Book Co.

Johnson, D. W., Johnson, R. T., & Stanne, M. E. (2000). *Cooperative learning methods: A meta-analysis*. Minneapolis, MN: University of Minnesota Press.

Kagan, S. (1992). *Cooperative Learning*. San Juan Capistrano, CA: Resources for Teachers, Inc.

Kaufman, D. B., Felder, R. M., & Fuller, H. (2000). Accounting for individual effort in cooperative learning teams. *J. Engr. Education, 89*(2), 133-140, [Online]. Available: wwwncsu.edu/felder-public/Papers/kaufmanpap.pdf

McFadzean, E. (2001a). Supporting virtual learning groups. Part 1: a pedagogical perspective. *Team Performance Management, 7*(3/4), 53-62.

McFadzean, E. (2001b). Supporting virtual learning groups. Part 2: an integrated approach. *Team Performance Management, 7*(5/6), 77-93.

McFadzean, E., & McKenzie, J. (2001). Facilitating virtual learning groups: A practical approach. *The Journal of Management Development, 20*(6), 470-494.

McGourty, J., & De Meuse, K. P. (2001). *The Team Developer: An Assessment and Skill Building Program*. New York: John Wiley & Sons, Inc.

Millis, B. J., & Cottell, P. G., Jr. (1998). *Cooperative Learning for Higher Education Faculty*. Phoenix, AZ: The Oryx Press.

Oakley, B. A. (2002). It takes two to tango: How 'good' students enable problematic behavior in teams. *Journal of Student Centered Learning, 1*(1), 19-27.

Obaya, A. (1999). Getting cooperative learning. *Science Education International, 10*(2), 25-27.

Salacik, G. R., & Pfeffer, J. (1978). A social information processing approach to job attitudes and task design. *Administrative Science Quarterly, 23*, 224-253.

Seymour, E., & Hewitt, N. M. (1997). *Talking About Leaving: Why Undergraduates Leave the Sciences*. Boulder, CO: Westview Press.

Sharon, S., & Sharon, Y. (1976). *Small-group Teaching*. Englewood Cliffs, NJ: Educational Technology Publications.

Shaw, M. E. (1983). Group composition. In H. H. Blumberg, A. P. Hare, V. Kent & M. F. Davies (Eds.), *Small Groups and Social Interaction* (Vol. 1). Chichester, England: John Wiley & Sons.

Smith, K.A. (2000). *Project Management and Teamwork*. New York: McGraw-Hill.

Springer, L., Stanne, M. E., & Donovan, S. (1997). *Effects of Small-Group Learning on Undergraduates in Science, Mathematics, Engineering, and Technology: A Meta-Analysis*. Madison, WI: National Institute for Science Education.

Stein, R. F., & Hurd, S. (2000). *Using Student Teams in the Classroom*. Bolton, MA: Anker Publishing Company, Inc.

Strbiak, C., & Paul, J. (1998). *The Team Development Fieldbook: A Step-by-Step Approach for Student Teams*: McGraw-Hill Primis Custom Publishing.

Strong, J. T., & Anderson, R. (1999). Free-riding in group projects: control mechanisms and preliminary data. *Journal of Marketing Education, 12*, 61-67.

Terenzini, P. T., Cabrera, A. F., Colbeck, C. L., Parente, J. M., & Bjorkland, S. A. (2001). Collaborative learning vs. lecture/ discussion: students' reported learning gains. *J. Engr. Education, 90*(1), 123-130.

Widnall, S. (1988). AAAS presidential lecture: Voices from the pipeline. *Science, 241*, 1740-1745.

Williams, L., Kessler, R. R., Cunningham, W., & Jeffries, R. (2000). Strengthening the case for pair programming. *IEEE Software, 17*(4), 19-25.

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Getting to Know You[†]

(If you feel uncomfortable answering any of these questions, you may leave that area blank. However, please complete as much as possible.)

Name:_____

What you would like to be called: _____

Address:_____

E-mail:_____ Grades in (Prereqs):_____

Phone Number: (w)_____(h)_____

(Optional) Gender_____

(Optional) Ethnicity _____ [African/African-American, Asian/Asian-American, Latino/a, Native American, White, Other (specify)]

Academic Major:_____

Year of Study (e.g. sophomore, junior, senior, returning for 2nd degree)_____

If returning for 2nd degree, what was first degree in?_____

Do you have a job aside from being a student? If so, where do you work and what do you do?

_____

Why do you want to be a _____ (insert profession)? [or, Why did you decide to major in _____, or, Why are you taking this course?]

_____

_____

What is something about you that is probably not true of other students in the class (for example, an unusual experience, hobby, skill, or interest)

_____

Favorite movie:_____

Favorite music or book:_____

Favorite hobby or sports Activity:_____

What is the most beautiful sight you have ever seen?_____

[†]Barbara Oakley, Oakland University, 2000.

GETTING TO KNOW YOU (page 2)

Times unavailable for group work. In the spaces below, please cross out the times when you will NOT be available to work outside class on assignments with your group. Mark only genuine conflicts, such as with classes or job responsibilities.

Time	M	T	W	H	F	Sat	Sun
8-9am							
9-10							
10-11							
11-12							
12-1pm							
1-2							
2-3							
3-4							
4-5							
5-6							
6-7							
7-8							
8-9							
9-10							
10-?							

Team Policies[†]

Your team will have a number of responsibilities as it completes problem and project assignments.

- *Designate a coordinator, recorder and checker for each assignment. Add a monitor for 4-person teams*. Rotate these roles for every assignment.
- *Agree on a common meeting time and what each member should have done before the meeting* (readings, taking the first cut at some or all of the assigned work, etc.)
- *Do the required individual preparation*.
- *Coordinator checks with other team members before the meeting to remind them of when and where they will meet and what they are supposed to do.*
- *Meet and work*. **Coordinator** keeps everyone on task and makes sure everyone is involved, **recorder** prepares the final solution to be turned in, **monitor** checks to makes sure everyone understands both the solution and the strategy used to get it, and **checker** double-checks it before it is handed in. Agree on next meeting time and roles for next assignment. For teams of three, the same person should cover the monitor and checker roles.
- *Checker turns in the assignment, with the names on it of every team member who participated actively in completing it*. If the checker anticipates a problem getting to class on time on the due date of the assignment, it is his/her responsibility to make sure someone turns it in.
- *Review returned assignments*. Make sure everyone understands why points were lost and how to correct **errors**.
- *Consult with your instructor if a conflict arises that can't be worked through by the team*.
- Dealing with non-cooperative team members. If a team member refuses to cooperate on an assignment, his/her name should not be included on the completed work. If the problem persists, the team should meet with the instructor so that the problem can be resolved, if possible. If the problem still continues, the cooperating team members may notify the uncooperative member in writing that he/she is in danger of being fired, sending a copy of the memo to the instructor. If there is no subsequent improvement, they should notify the individual in writing (copy to the instructor) that he/she is no longer with the team. The fired student should meet with his/her instructor to discuss options. Similarly, students who are consistently doing all the work for their team may issue a warning memo that they will quit unless they start getting cooperation, and a second memo quitting the team if the cooperation is not forthcoming. Students who get fired or quit must either find another team willing to add them as a member or get zeroes for the remaining assignments.

As you will find out, group work isn't always easy—team members sometimes cannot prepare for or attend group sessions because of other responsibilities, and conflicts often result from differing skill levels and work ethics. When teams work and communicate well, however, the benefits more than compensate for the difficulties. One way to improve the chances that a team will work well is to agree beforehand on what everyone on the team expects from everyone else. Reaching this understanding is the goal of the assignment on the *Team Expectations Agreement* handout.

[†]Adapted from R. M. Felder & R. Brent, Effective Teaching, North Carolina State University, 2000.

TEAM EXPECTATIONS AGREEMENT[†]

On a single sheet of paper, put your names and list the rules and expectations you agree as a team to adopt. You can deal with any or all aspects of the responsibilities outlined above—preparation for and attendance at group meetings, making sure everyone understands all the solutions, communicating frankly but with respect when conflicts arise, etc. Each team member should sign the sheet, indicating acceptance of these expectations and intention to fulfill them. Turn one copy into the professor, and keep a remaining copy or copies for yourselves.

These expectations are for your use and benefit—they won't be graded or commented on unless you specifically ask for comments. Note, however, that if you make the list fairly thorough without being unrealistic you'll be giving yourselves the best chance. For example, "We will each solve every problem in every assignment completely before we get together" or "We will get 100 on every assignment" or "We will never miss a meeting" are probably unrealistic, but "We will try to set up the problems individually before meeting" and "We will make sure that anyone who misses a meeting for good cause gets caught up on the work" are realistic.

[†]R. M. Felder & R. Brent, *Effective Teaching*, North Carolina State University, 2000.

Evaluation of Progress Toward Effective Team Functioning[†]

Your Team Name:_____

Symptoms of Internal Meeting Problems	Usually	Sometimes	Hardly Ever
Team meetings generally begin 5-15 minutes late			
Members often arrive late, leave early, or never even show up for the meetings.			
No agenda exists—members simply have a vague notion of what they want to accomplish.			
One or two members monopolize discussion throughout the meeting.			
Members have not read the assignment, performed the necessary background research, or done what they were expected to do. Consequently, individuals are poorly prepared for the meeting.			
With words or by appearance, some members clearly convey that they would rather be elsewhere.			
Members constantly interrupt each other or talk in pairs without listening to the individual who has the floor.			
Issues never get resolved, only put on the back burner until next time.			
No follow-up action plan is developed. Members are confused with regard to what the next step is and who is responsible for performing it.			
The same individual or individuals end up doing the majority of the work. The meetings run on and on and on with little to show for the time spent on them			
Assignments are not completed on time or are completed poorly.			

[†]Adapted from Jack McGourty and Kenneth P. De Meuse, *The Team Developer: An Assessment and Skill Building Program*, 2001, John Wiley & Sons, New York.

TEAM MEMBER EVALUATION FORM[†]

The following evaluation of your team members is a tool to help improve your experience with group work. Its purpose is to determine those who have been active and cooperative members as well as to identify those who did not participate. Be consistent when evaluating each group member's performance by using the guidelines below.

1 – never 2 – rarely 3 – sometimes 4 – usually 5 – always

Name of student being evaluated:_____

Circle your responses.

• Has the student attended team meetings?	1	2	3	4	5
• Has the student made a serious effort at assigned work before the team meetings?	1	2	3	4	5
• Has the student made a serious effort to fulfill his/her team role responsibilities on assignments?	1	2	3	4	5
• Has the student notified a teammate if he/she would not be able to attend a meeting or fulfill a responsibility?	1	2	3	4	5
• Does the student attempt to make contributions in group meetings?	1	2	3	4	5
• Does the student listen to his/her teammates' ideas and opinions respectfully and give them careful consideration?	1	2	3	4	5
• Does the student cooperate with the group effort?	1	2	3	4	5

Based on your responses to these questions, assign an overall rating on the following scale:
_____ (Insert one of the given words.)

Excellent	Consistently carried more than his/her fair share of the workload
Very good	Consistently did what he/she was supposed to do, very well prepared and cooperative
Satisfactory	Usually did what he/she was supposed to do, acceptably prepared and cooperative
Ordinary	Often did what he/she was supposed to do, minimally prepared and cooperative
Marginal	Sometimes failed to show up or complete assignments, rarely prepared
Deficient	Often failed to show up or complete assignments, rarely prepared
Unsatisfactory	Consistently failed to show up or complete assignments, rarely prepared
Superficial	Practically no participation
No show	No participation at all

[†]Adapted from a form reprinted in B. J. Millis and P. G. Cottell, Jr., Cooperative Learning in Higher Education Faculty, Oryx, Phoenix, 1998.

Peer Rating of Team Members[†]

Your Name_____ Your Team _____

Please write the names of all of your team members, INCLUDING YOURSELF, and rate the degree to which each member fulfilled his/her responsibilities in completing the team assignments. *DO NOT LEAVE ANY COMMENTARY BLANK!* Place this form in a sealed envelope, with your team name/number on the outside, and give it to your instructor. The possible ratings are as follows:

Excellent: Consistently carried more than his/her fair share of the workload.
Very good: Consistently did what he/she was supposed to do, very well prepared and cooperative.
Satisfactory: Usually did what he/she was supposed to do, acceptably prepared and cooperative.
Ordinary: Often did what he/she was supposed to do, minimally prepared and cooperative.
Marginal: Sometimes failed to show up or complete assignments, rarely prepared.
Deficient: Often failed to show up or complete assignments, rarely prepared.
Unsatisfactory: Consistently failed to show up or complete assignments, unprepared.
Superficial: Practically no participation.
No show: No participation at all.

These ratings should reflect each individual's level of participation and effort and sense of responsibility, not his or her academic ability.

Name of team member	Rating	Commentary (DO NOT LEAVE BLANK!)
_____	_____	_____
		_____
		_____
_____	_____	_____
		_____
		_____
_____	_____	_____
		_____
		_____
_____	_____	_____
		_____
		_____

Your Signature _____

[†]Adapted from R. M. Felder & R. Brent, *Effective Teaching*, North Carolina State University, 2000.

Autorating System[†]

1. Determine group project grade.

2. Convert individual verbal ratings from the Peer Rating form to numbers, as follows:

   Excellent = 100
   Very good = 87.5 Satisfactory = 75 Ordinary =62.5
   Marginal = 50
   Deficient = 37.5 Unsatisfactory = 25 Superficial =12.5
   No show = 0

3. On a spreadsheet, enter numerical ratings received by team members in rows.

4. Average individual marks, calculate overall team average, calculate adjustment factors as individual average divided by team average. If an adjustment factor is greater than 1.05, reset it to 1.05.

5. Individual project grade = (team grade) ´ (adjustment factor).

Example

Team project grade	80							Indiv. Proj. Grade
Name	Vote 1	Vote 2	Vote 3	Vote 4	Indiv. Avg.	Team Avg.	Adj. Fctr.	
Betty	87.5	87.5	75	87.5	84.4	82.0	1.02	82
Carlos	87.5	100	87.5	87.5	90.6	82.0	1.05	84
John	62.5	75	50	75	65.6	82.0	0.80	64
Angela	87.5	87.5	87.5	87.5	87.5	82.0	1.05	84

[†]Kaufman, Felder, and Fuller (2000). This sheet is for instructor to use and is not handed out to students. Adapted from Brown, R. W. (1995). *Autorating: Getting individual marks from team marks and enhancing teamwork. 1995 Frontiers in Education Conference Proceedings*, Paper 3C24.

Coping with Hitchhikers and Couch Potatoes on Teams†

You will usually find your university teammates as interested in learning as you are. Occasionally, however, you may encounter a person who creates difficulties. This handout is meant to give you practical advice for this type of situation.

To begin with, let's imagine you have been assigned to a combined homework and lab group this semester with three others: Mary, Henry, and Jack. Mary is okay—she's not good at solving problems, but she tries hard, and she willingly does things like get extra help from the professor. Henry is irritating. He's a nice guy, but he just doesn't put in the effort to do a good job. He'll sheepishly hand over partially worked homework problems and confess to spending the weekend watching TV. Jack, on the other hand, has been nothing but a problem. Here are a few of the things Jack has done:

- When you tried to set up meetings at the beginning of the semester, Jack just couldn't meet, because he was too busy.
- Jack infrequently turns in his part of the homework. When he does, it's almost always wrong—he obviously spent just enough time to scribble something down that looks like work.
- Jack has never answered phone messages. When you confront him, he denies getting any messages. You e-mail him, but he's "too busy to answer."
- Jack misses every meeting—he always promises he'll be there, but never shows up.
- His writing skills are okay, but he can't seem to do anything right for lab reports. He loses the drafts, doesn't reread his work, leaves out tables, or does something sloppy like write equations by hand. You've stopped assigning him work because you don't want to miss your professor's strict deadlines.
- Jack constantly complains about his fifty-hour work weeks, heavy school load, bad textbooks, and terrible teachers. At first you felt sorry for him—but recently you've begun to wonder if Jack is using you.
- Jack speaks loudly and self-confidently when you try to discuss his problems–he thinks the problems are everyone else's fault. He is so self-assured that you can't help wondering sometimes if he's right.

Your group finally was so upset they went to discuss the situation with Professor Distracted. He in turn talked, along with the group, to Jack, who in sincere and convincing fashion said he hadn't really understood what everyone wanted him to do. Dr. Distracted said the problem must be the group was not communicating effectively. He noticed you, Mary, and Henry looked angry and agitated, while Jack simply looked bewildered, a little hurt, and not at all guilty. It was easy for Dr. Distracted to conclude this was a dysfunctional group, and everyone was at fault—probably Jack least of all.

The bottom line: *You and your teammates are left holding the bag. Jack is getting the same good grades as everyone else without doing any work. Oh yes—he managed to make you all look bad while he was at it.*

What this group did wrong: Absorbing

This was an 'absorber' group. From the very beginning they absorbed the problem when Jack did something wrong, and took pride in getting the job done whatever the cost. *Hitchhikers count on you to act in a self-sacrificing manner.* However, the nicer you are (or the nicer you think you are being), the more the hitchhiker will be able to hitchhike their way through the university—and through life. By absorbing the hitchhiker's problems, you are inadvertently training the hitchhiker to become the kind of person who thinks it is all right to take credit for the work of others.

What this group should have done: Mirroring

It's important to reflect back the dysfunctional behavior of the hitchhiker, so the hitchhiker pays the price—not you. Never accept accusations, blame, or criticism from a hitchhiker. Maintain your own sense of reality despite what the hitchhiker says, (easier said

†This essay is a brief, adapted version from "It Takes Two to Tango: How 'Good' Students Enable Problematic Behavior in Teams," Barbara Oakley, Journal of Student Centered Learning, Volume 1, Issue 1, Fall, 2002, pp. 19-27.

than done). *Show you have a bottom line: there are limits to the behavior you will accept*. Clearly communicate these limits and act consistently on them. For example, here is what the group could have done:

- When Jack couldn't find time to meet in his busy schedule, even when alternatives were suggested, you needed to decide whether Jack was a hitchhiker. Was Jack brusque, self-important, and in a hurry to get away? Those are suspicious signs. Someone needed to tell Jack up front to either find time to meet, or talk to the professor.
- If Jack turns nothing in, his name does not go on the finished work. (Note: if you know your teammate is generally a contributor, it is appropriate to help if something unexpected arises.) Many professors allow a team to fire a student, so the would-be freeloader has to work alone the rest of the semester. Discuss this option with your instructor if the student has not contributed over the course of an assignment or two.
- If Jack turns in poorly prepared homework or lab reports, you must tell him he has not contributed meaningfully, so his name will not go on the submitted work. No matter what Jack says, stick to your guns! If Jack gets abusive, show the professor his work. Do this the first time the junk is submitted, before Jack has taken much advantage—not after a month, when you are really getting frustrated.
- Set your limits early and high, because hitchhikers have an uncanny ability to detect just how much they can get away with.
- If Jack doesn't respond to e-mails, answer phone messages, or show up for meetings, don't waste more time trying to contact him. (It can be helpful, particularly in industry, to use e-mail for contacting purposes, because then a written record is available about the contact attempt. Copying the e-mail to Jack's supervisor or other important people can often produce surprisingly effective results.)
- Keep in mind the only one who can handle Jack's problems is Jack. You can't change him—you can only change your own attitude so he no longer takes advantage of you. Only Jack can change Jack—and he will have no incentive to change if you do all his work for him.

People like Jack can be skilled manipulators. By the time you find out his problems are never-ending, and he himself is their cause, the semester has ended and he is off to repeat his manipulations on a new, unsuspecting group. Stop allowing these dysfunctional patterns early in the game—before the hitchhiker takes advantage of you and the rest of your team!

Henry, the Couch Potato

But we haven't discussed Henry yet. Although Henry stood up with the rest of the group to try to battle against Jack's irrational behavior, he hasn't really been pulling his weight. (If you think of yourself as tired and bored and really more interested in watching TV than working on your homework—everyone has had times like these—you begin to get a picture of the couch potato.)

You will find the best way to deal with a couch potato like Henry is the way you deal with a hitchhiker: set firm, explicit expectations—then stick to your guns. Although couch potatoes are not as manipulative as hitchhikers, they will definitely test your limits. If your limits are weak, you then share the blame if you have Henry's work to do as well as your own.

But I've Never Liked Telling People What to Do!

If you are a nice person who has always avoided confrontation, working with a couch potato or a hitchhiker can help you grow as a person and learn the important character trait of firmness. Just be patient with yourself as you learn. The first few times you try to be firm, you may find yourself thinking—'but now he/she won't like me—it's not worth the pain!' But many people just like you have had exactly the same troubled reaction the first few (or even many) times they tried to be firm. Just keep trying—and stick to your guns! Someday it will seem more natural and you won't feel so guilty about having reasonable expectations for others. In the meantime, you will find you have more time to spend with your family, friends, or schoolwork, because you aren't doing someone else's job along with your own.

Common Characteristics that Allow a Hitchhiker to Take Advantage

- Unwillingness to allow a slacker to fail and subsequently learn from their own mistakes.
- Devotion to the ideal of 'the good of the team'—without common-sense realization of how this can allow others to take advantage of you. Sometimes you show (and are secretly proud of) irrational loyalty to others.
- You like to make others happy even at your own expense.
- You always feel you have to do better—your best is never enough.
- Your willingness to interpret the slightest contribution by a slacker as 'progress.'
- You are willing to make personal sacrifices so as to not abandon a hitchhiker—without realizing you are devaluing yourself in this process.
- Long-suffering martyrdom—nobody but you could stand this.
- The ability to cooperate but not delegate.
- Excessive conscientiousness.
- The tendency to feel responsible for others at the expense of being responsible for yourself.

A related circumstance: you're doing all the work

As soon as you become aware everyone is leaving the work to you—or doing such poor work that you are left doing it all, you need to take action. Many professors allow you the leeway to request a move to another team. (You cannot move to another group on your own.) Your professor will probably ask some questions before taking the appropriate action.

Later on—out on the job and in your personal life

You will meet couch potatoes and hitchhikers throughout the course of your professional career. Couch potatoes are relatively benign, can often be firmly guided to do reasonably good work, and can even become your friends. However, hitchhikers are completely different people—ones who can work their way into your confidence and then destroy it. (Hitchhikers may infrequently try to befriend you and cooperate once you've gained their respect because they can't manipulate you. Just because they've changed their behavior towards you, however, doesn't mean they won't continue to do the same thing to others.) Occasionally, a colleague, subordinate, supervisor, friend, or acquaintance could be a hitchhiker. If this is the case, and your personal or professional life is being affected, it will help if you keep in mind the techniques suggested above.