CONTINUOUS ADDITIVE PEER REVIEW: A NEW SYSTEM TO CONTROL SOCIAL LOAFING IN GROUP PROJECTS

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ABSTRACT

Current methods to reduce social loafing in group projects suffer several weaknesses. They are difficult to implement, take up a lot of the instructor's time, deal with the problem of free-riding ex post facto, and do little to prevent the problem in the first place. A proposed method, called Continuous Additive Peer Review (CAPR), overcomes some of the weaknesses of the current methods and suggests a new way of performing peer reviews that puts the onus of group work on the students. The CAPR method requires group members to use a continuous evaluation method whereby they keep track of the contributions of each individual group member. Such continuous evaluation may inhibit or reduce free riding. The key benefits of the CAPR method are its simplicity, ease of implementation, and consequent reduction in the time commitment required of the instructor.

INTRODUCTION

Social loafing, also referred to as free riding, emerges in virtually all group situations in which the rewards are shared equally but the individual contributions are difficult to quantify or discern (Strong and Anderson 1990). The problem is well known to educators who use group projects to communicate the importance of group work to students, improve their teamwork abilities, and provide them with important job skills, such as communication and leadership (Williams et al. 1991), that employers value (Abernethy and Lett III 2005; Cunningham 1995). Group projects are used by most business school faculty, because the Association to Advance Collegiate Schools of Business (AACSB) standards for business schools specifically require that faculty encourage collaboration and cooperation among students. Furthermore, the AASCB requires that to receive accreditation, degree programs must include learning experiences that entail group and organizational dynamics (Aggarwal and O'Brien 2008).

Free riding, an economic concept, occurs in large collectives. A free rider in economic terms is one who derives more benefits from the group than he or she contributes (Comer 1995). In classroom settings, free riding occurs when a student in a group setting decides to contribute little or nothing to the group's work. Social loafing on the other hand is a social psychological term, coined by Latane et al. (1979), to describe the situation that occurs when individuals in groups exert less effort than they would when working alone. For example, individuals shout and clap harder when alone than when in a group. In most literature on group or teamwork, these terms get used interchangeably. However, we use the term "social loafing" specifically to denote a benign version of free riding. Whereas free riding represents an extreme version that does not occur frequently, social loafing is much more prevalent and can be much harder to curb.

Specifically, in free-riding situations, one student fails to contribute to the group at all, whereas social loafing occurrences are more nuanced. Consider two brief examples. First, for a complex group project, one student never shows up for group meetings and discussions but eventually makes a decent individual contribution to the group by typing and formatting the entire final report. Second, imagine a student who is very fastidious when it comes to attending group meetings but always tardy in turning in his or her contributions to the group task. In both these examples, the student's lack of full participation affects the learning outcomes and/or grades for the group, though such behavior generally escapes sanction from the group or the instructor, because it does not represent free riding. In both examples, the loafing student receives the benefit of the doubt, because he or she has avoided crossing the boundary that defines free riding for that group.

Various methods exist to curb social loafing in group projects, including firing students from groups (Abernethy and Lett III 2005), expanding classroom exercises (Deeter-Schmelz and Ramsey 1998), using a diary method (Dommeyer 2007), incentivizing team leaders (Ferrante et al. 2006), using classroom assessment tools such as CECAT (Corbin 2002), or relying on peer evaluations (Clark 1989). Aggarwal and O'Brien (2008) have evaluated the various ways to curb social loafing and found that smaller group sizes, breaking big projects into smaller parts, and conducting multiple peer evaluations can lead to improved satisfaction with group projects. Although these methods all work to some extent, the problem of social loafing still exists. This article therefore attempts to address the issue by suggesting a novel system that may

curb or reduce social loafing behavior, which we denote Continuous Additive Peer Review (CAPR). The CAPR system relies on a CAPR contact sheet, filled in by each group to document and evaluate group work on a continuous basis. The CAPR method can be used in conjunction with other remedies, such as smaller group sizes. To test the effectiveness of this system empirically, we apply it in two undergraduate marketing classes that included group projects. The results show that CAPR is associated with decreased social loafing and greater student satisfaction with group work.

LITERATURE REVIEW

It is important to understand why social loafing takes place. Researchers have offered different explanations for the phenomenon. Social loafing occurs primarily when task visibility is low. Task visibility is defined as an individual belief that others are aware of his or her effort (Tan and Tan 2008). When a person works alone, task visibility is high, and the effort expended by the person is easy to ascertain. However when the same person works as part of a group, task visibility declines. The person might believe that additional effort will go unnoticed (Stark et al. 2007), so he or she may reduce the amount of his or her contribution to the group. Similarly, the extent of task interdependence could drive social loafing. Task interdependence means that when group members perceive that the tasks they must accomplish are interdependent, that perception reduces their sense of personal accomplishment, so they tend to reduce their effort devoted to group work (Liden et al. 2004). Social loafing also may occur when group members expect others to engage in social loafing (Jackson and Harkins 1986; Kugihara 1999). The group members who expect such loafing reduce their effort to avoid falling victim to the so-called sucker effect (Comer 1995; Dommeyer and Lammers 2006; Kerr 1983). Comer (1995) also suggests that group members who believe that they are less able or inferior compared with their peers could reduce their contributions, because then they can develop a sense that they are unnecessary for the job or avoid exposing their lack of understanding to others (Aggarwal and O'Brien 2008). Other explanations for social loafing have ranged from laziness (Williams et al. 1991) to low self-esteem (Shepperd and Wright 1989) to the presence of dominant partners who do not allow others to contribute (Beatty et al. 1996).

SOLUTIONS FOR REDUCING SOCIAL LOAFING

Because social loafing in group projects is a significant concern, many tactics to curb it appear in prior literature. We wanted to discover instead what faculty members actually use in their classrooms. The motivation to determine actual usage was twofold. First, we wanted to identify any potential methods being used that had not been documented in prior literature. Second, we wanted to examine if any methods were particularly preferred by instructors. Therefore, we posted an exploratory question on ELMAR (a marketing faculty listserv), asking faculty members from around the world to describe how they dealt with social loafing in groups. The 47 responses we received form the basis for our analysis in this section. The systems generally fall into four basic categories: firing, divorce, anonymous peer evaluation, and continuous feedback and mentoring. We next detail each of these categories, including the benefits and concerns associated with their impact on faculty members' required time and effort. We provide a summary of the various methods in Table 1.

The Firing System

Faculty members who prefer a total hands-off approach to group projects tend to adopt this simple system. In our informal survey, many respondents expressed the view that this system is the closest approximation of the real world available in academia: If someone does not perform, they get fired. The firing system therefore teaches students the severe consequences of failing to contribute to the task at hand. According to Abernethy and Lett (2005), this system successfully curbs free riding but does little to reduce social loafing.

There are two versions of the firing system. The first and milder version requires fired members to form a group with fellow fired members to complete the project or do it on their own. This "penalty" therefore mandates that they complete the project but eliminates the chance of social loafing. In the second version, the fired members simply earn no points in the group project. Group members therefore must give the social loafer adequate notice that he or she has not contributed adequately and is in danger of being fired. When the social loafer ignores this warning or does not improve, he or she is fired. The key theory behind the firing system is that the fear of being fired, or failing the class, motivates social loafers to either drop out of the class or start contributing.

The simplicity of the firing system encourages many faculty members to use it. However, it suffers some flaws that have led them to try other systems as well. In particular, the firing system is an "all-or-nothing" technique, as evidenced by its ability to curb free riding but failure to minimize social loafing. If a free rider receives notice that he or she is in danger of being fired for not showing up for meetings, all this person must do is show up for meetings and submit something, irrespective of its quality. The firing system is also an extreme penalty, and most instructors require evidence of continuous disregard for group norms. Therefore, a social loafer can earn an equal share

TABLE 1
SUMMARY OF METHODS USED BY BUSINESS SCHOOL FACULTY TO CURB FREE-RIDING

Method *(Examples provided by respondents)*	**Total Number of Responses**
Limiting size of groups *(Maximum group size limited to three)*	3
Informal peer review *(This technique doesn't use the peer review in the final grade, as that can be considered as grading by students, which could go against university policy)*	1
Anonymous formal peer review *(The grades for the individual student is dependent on the peer review)*	15
Divorce method *(Students are allowed to leave groups if they feel that others are not contributing equally)*	6
Extensive handholding *(The faculty meets with the groups multiple times to ensure that free riding never occurs)*	6
Firing free riders *(Students are allowed to fire free riders provided notice to improve is given before hand)*	8
Hands-off method *(Used for graduate students. The understanding is that free riding happens in real life and students should get used to it)*	1
Essays about group experience *(students write essays about the project, detailing the problem and how it was tacked. The expectation is that free riders would know enough details about the work to answer coherently)*	2
Anonymous multiple peer evaluations *(students evaluate each other multiple times. The individual project grade is determined by the ongoing peer evaluation)*	7
Minutes of meeting *(Groups keep and submit minutes of meeting to the instructor at the end of the semester)*	1

Notes: Some instructors use more than one method. This is a non-representative sample of methods currently being used. Instructors have various other versions that are not represented here. This table was constructed from responses obtained from a posting in ELMAR.

of the grade, even if that student contributes much less than is required. Instituting this system thus may reduce free riding but end up increasing social loafing.

Another issue with the firing system is that it involves extreme confrontation, and researchers find that students generally want to avoid such situations (Strong and Anderson 1990). In large groups, firing a member would require coordination among multiple members. Unless consensus exists among the remaining group members, the focal student can likely get away with loafing, without penalty. If a student does get fired, it increases the workload of the instructor, who now must verify that the firing was legitimate and determine whether to allow the loafing student to complete the project alone or award no points for the group work. Anecdotal evidence suggests that most fired students do not dispute the firing, but they offer reasons why they could not contribute to the group and ask for a second chance to finish the project themselves. When instructors allow students to do so, their workload increases, because they now must grade more projects.

Overall, the firing system can work well to reduce the number of complaints, but it likely does not solve the underlying problem. Rather, it may just convert free riders into social loafers.

The Divorce System

The reverse of the firing system, though they sometimes appear in conjunction, is the divorce system, which assumes that in each group, one or two lead students do all the work and unfairly bear the burden of social loafers. These lead students likely resent others' social loafing (Kerr 1983), so they should be allowed to divorce themselves from the group and complete the project on their own. Yamagishi (1988) finds that high performers frequently elect to leave groups to avoid pooling their grades with other group members. If the lead member leaves, the social loafers seemingly are forced to do more work, but the divorce system does not require that the lead member confront the social loafers.

Although this system is easy, it too suffers from a few problems. First, it reinforces the belief among lead students that they are better or more capable than others, which can reduce their capacity to work effectively with different people of varying capabilities. Second, it runs counter to the principle of group work, because the divorced member does not achieve the benefits of learning how to work in groups (Aggarwal and O'Brien 2008). Third, because this system lacks any control mechanisms, the divorcing member does not need to document any infractions of the social loafer, the social loafer receives no penalty, and the rest of the group takes on the burden of the social loafer. This system also creates problems for instructors in terms of extra time required to grade the lead students' additional individual projects.

Anonymous Peer Evaluation

This popular system requires every member of the group to evaluate one another at the end of the project or semester (Brooks and Ammons 2003). Some instructors require individual group members to distribute 100 points among all group members (constant sum). After collecting these ratings, instructors use them either to identify problem groups or to reward different group members directly.

When instructors use the rating to identify problem groups, they must expend significant time and effort to discover the truth about any alleged social loafing. Generally instructors will sit down with the accused social loafer to investigate why the group might have given him or her such a low score. Anecdotal evidence suggests that accused students often claim that other group members are penalizing them over personality issues. At this stage, it becomes the instructor's burden to separate the truth from fiction and then deal with the necessary confrontations (Abernethy and Lett III 2005). The instructor must decide whether to penalize the student; any penalty imposed can be subject to academic challenge.

Some instructors use the rating system directly to reward or penalize students in the group and generally make this usage clear to students in the syllabus. However, problems can occur if social loafers band together to assign low evaluations to hard workers. Although this problem is not common, anecdotal evidence again suggests that it occurs. The evaluations are anonymous, so students may underestimate the work of others and overestimate their own work (Haas et al. 1998). Even social loafers may suffer overly low or hard evaluations in this case, which can prompt challenges by the social loafers on the grounds of fairness.

Anonymous peer evaluation also does not solve the social loafing problem, because the offending student only hears his or her peers' evaluations at the end of the semester. Thus, this system solves the equity issue but does not provide any opportunity for the offending student to change his or her behaviors. Some instructors use peer evaluations multiple times throughout a semester to ensure timely feedback. According to Brooks and Ammons (2003), peer evaluations are more effective when they are gathered multiple times throughout the term. However, multiple evaluations require significant work by the instructor. For example, in a class of 40 students with four member groups, if every student were to complete three evaluations, the result would be a total of 120 evaluations. If instructor requires evaluations three times in the semester, they must review 360 evaluations. Anonymous peer evaluation thus can easily turn into a logistical nightmare for instructors, unless they use dedicated computer software to reduce task complexity. Yet computer software by its very nature is not really anonymous, so this scenario creates the potential problem of convincing students that their responses are truly confidential.

Continuous Feedback and Mentoring System

Some instructors favor this final system in the belief that social loafing is usually the result of poor supervision. The continuous feedback system requires the instructor to meet with the student teams on a regular basis to check their progress in terms of the project objectives. The instructor becomes an internal mediator or mentor for the team, performs extensive handholding during the group project, and remains involved to prevent social loafing problems from ever developing.

Instructors who have used this system attest to its effectiveness. However, like all systems, it suffers from some weaknesses. First, it demands a tremendous time commitment from the instructor, who must meet with each group multiple times during the course of a semester. For most instructors who teach multiple courses, this requirement represents the primary impediment to this system. Second, this system does not allow students to gain the real-life experience of working in groups. It shields students from dealing with tough situations and allows them to avoid confrontations. Therefore, this system may mean that the class is not preparing students

sufficiently for the real world. The faculty member becomes a de facto group member.

A variation on the continuous feedback method is the diary method (Dommeyer and Lammers 2006). In our informal survey, two respondents used some version of the diary method, such that they required group members to write essays about their group work experience. The students documented any problems they faced during the group project and noted how they tackled the problem. At the end of the semester, the faculty members collected and read all the essays; ideally, they could recognize and penalize the social loafers, because these students would not know enough about the actual project to write convincingly about it. In another variation, the groups kept minutes of their meetings, which were submitted to the instructor. The minutes should reveal social loafers who did not attend or participate consistently in meetings.

The diary method and its variations suffer from some common problems too. First, they demand significant time commitments and therefore may not be feasible for large classes. To catch and penalize social loafers, instructors must read all the essays and take care to distinguish reality from fiction. Second, these methods do nothing to curb social loafing during the course of the group work. Rather, they rely mainly on the deterrent value of the students' knowledge that, at the end of the semester, social loafers will be caught and penalized.

The Need for a Better System

The preceding discussion clearly reveals the real need for a system that overcomes some of the problems associated with existing methods. An improved system should incorporate the benefits of existing systems while overcoming their flaws. Thus, an ideal system

1. Allows students to learn on their own how to deal with social loafers.
2. Gives social loafers timely feedback about the disadvantages of failing to participate in group work.
3. Rewards students for contributing to the overall result (quality of the submitted work), as well as for contributing to the process of group work (participation in group meetings and group discussions).
4. Embraces equity and penalizes social loafers appropriately. A student who does not contribute in equal measure does not receive a reward equal to that earned by a student who works on all parts of the project.
5. Is simple to apply, which may be the most important criterion from the point of view of the instructor. An ideal system reduces the logistics required to implement the system. Any system that involves collecting and collating huge amounts of data would be difficult to implement.
6. Is easy for all students to understand.
7. Is as objective as possible, which minimizes any bias that group members and instructors might have toward social loafers and reduces the opportunities for grade challenges.
8. Minimizes the role of the instructor as a mediator between students and increases the transparency of the process of grading.

The goal of this research is to introduce a system that fits these criteria and reduces social loafing in group projects. The Continuous Additive Peer Review (CAPR) system fulfills most of the preceding criteria: It reduces social loafing and improves student satisfaction with the grading process. The overall simplicity of the system also should make it appealing to the broader academic community.

Continuous Additive Peer Review

The proposed CAPR system derives from the peer evaluation system, in which students conduct a peer review at the end of the semester and allocate a grade or score to other members of the group. However, CAPR mandates that instead of performing the peer review at the end of the semester, the evaluation represents a continuous process that informs the social loafer about his or her performance. Thus, CAPR focuses on both the process and the outcome of a group project and penalizes social loafers for failing in either context. Because the feedback begins from the first meeting, social loafers also have plenty of time to revise their behaviors.

The CAPR system begins at the time the group forms. In the experiments used to test this system, each group contains no more than four members, and the students formed their own groups. After the groups formed, each one nominated a group contact who would act as the point of contact between the instructor and the group. The group contact served as the record keeper for the group and completed the CAPR contact sheet (Figure 1), which the instructor initialed every two weeks. An effort was made to impress on the group that the group contact was only the record keeper, not the group leader. Therefore, the task of organizing the group and maintaining group cohesion should be shared by all group members equally. The group contact entered data into the CAPR contact sheet every time the group conducted a meeting or completed a deliverable. A deliverable is defined as any activity that the group had decided is due on a particular day. For example, if the group decided that all members would come prepared with a few articles to each class meeting, this requirement constitutes a deliverable.

As Figure 1 shows, the CAPR sheet consists of four main data groups. The first two columns record the date and activity performed. Every time the group meets or sets a deliverable, the group contact notes the date and requirement. The weight column reveals the weight that the

group members assign to that activity. This weight is determined by the members who show up for the meeting or through mutual consent. For example, members may decide that showing up for a normal meeting to discuss progress (without a deliverable) is worth two points. Every member who attends that meeting earns two points; those who miss it earn no points. Because these points are additive in nature, those who miss meetings get penalized (albeit rather minimally) immediately. This approach provides a signal to social loafers that the group project will require their involvement from the very beginning and throughout all the stages.

The group members determine the importance of each activity on their own without any input from the instructor. For example, some meetings are more important than others. In the Figure 1 example, the meeting to discuss the job divisions is worth 5 points, and by missing it, "Becky" gets no points. If Becky does a better job in terms of the quality of her submission, relative to others, she can make up these lost points, but if she does not improve in the latter part of the assignment, her points are permanently reduced. Students are instructed to quantify every activity that they undergo and assign points to each activity, including work quality. The instructions for this system make it clear that if there is a disagreement in terms of the weights, the group should use a simple majority rule. During submission all group members then sign the CAPR contact sheet next to their names, signifying their agreement with the documentation of the group work.

At the end of the semester, after summing the weights and the points obtained by each group member, the individual work percentage can be calculated by dividing the points earned by the summed weights. This number forms the basis for the individual grades. The instructor grades each project on its merits, which forms the group grade. If all members take part in the process and the outcome equally, they all earn equal grades. If some members do not contribute equally, they earn a worse individual grade than the rest of the group. Social loafers who only contribute to parts of the group project therefore are identified and penalized.

The CAPR system offers several advantages. The first and most important is its simplicity. Instead of collecting hundreds of peer reviews from each class to identify social loafers, the instructor can simply collect peer reviews, equal to the number of groups in a class. This feature differentiates it from multiple peer evaluations, in which each group member evaluates each other member multiple times. In larger classes, this method is very difficult to apply, because not only does the faculty member have to deal with hundreds of peer evaluations, but to ensure that the multiple peer evaluations work, the instructor also must share the results with the groups multiple times. This situation clearly can become a logistical nightmare for the faculty member. Using the example we noted previously, multiple peer evaluations for a class of 40 students (with four-member groups) at three points in the semester require collecting 360 individual evaluations. Then this instructor would need to calculate the scores for each group, to share them in a timely manner with the individual groups. The same information can be shared through CAPR using only 10, instead of 360, evaluations. Furthermore, the larger the class, the better CAPR performs in comparison with multiple anonymous peer evaluations.

The second benefit pertains to the additive and continuous nature of the data collection. Because the evaluation relies on an additive, continuous function, it reveals to the social loafer that he or she must participate in all aspects of group work, because any lack of participation will be penalized. Therefore, social loafers cannot escape accountability by doing just some of the work required. Another advantage of this system thus emerges, because it teaches students how to take charge: They must decide on their own how much each component of their group work should be valued. The responsibility of getting the group dynamics in working order therefore moves to students.

Moreover, the CAPR system lessens the amount of confrontation with the social loafers. Unlike the firing method, students rarely confront others in the CAPR system, because in most cases, they select simple criteria, such as "Did all group members submit their part of the work by the required date?" However, the CAPR method involves more confrontation than the anonymous peer evaluation, which has almost no confrontation during the course of the project. In the anonymous peer evaluation, students simply pass the confrontation task to the instructor. In the CAPR method, they still take part in some confrontation, albeit on a less intense scale. Thus the CAPR method allows students to learn gradually how to deal with problems and confrontations. Finally, CAPR is more objective than the peer evaluation system. Student evaluations refer to mostly objective criteria, so social loafers cannot claim discrimination. The objectivity of the system is far superior to that of an anonymous peer review system, which forces the group to evaluate one another using an overall evaluation rather than specific criteria.

Finally, this system is easy for students to understand and teaches good lessons about working in groups. In real life, a work group that does not get along often does not have the option of divorcing. Moreover, this system teaches students how to encourage participation from social loafers without firing them. The students take control of their own performance, because prior mistakes have already been penalized, so they must perform to the best of their abilities throughout the remainder of their tenure with the group. Both the process and the outcome are equally important for group work. Overall, the CAPR system meets the criteria established for an ideal system. We document the pros and cons of all five systems used to curb social loafing in Table 2.

FIGURE 1
SAMPLE EVALUATION SHEET

Group Work Evaluation Sheet (worked example)

Class: Principles of Marketing **Section**

Group Name: Flying Elephants _____
Product/ Assignment Name:

Group Member Names

Joe (Group Leader)
Kenny
Becky
Cartman

Activity and Grade Chart

Date	Activity/ Deliverable	Weight (1-10)	Group Member Name (give points below) Joe	Kenny	Becky	Cartman
10–Jan	1st meeting	2	2	2	2	2
15–Jan	meeting to discuss job division	5	5	5	0	5
20–Jan	follow up meeting	2	2	2	0	0
30–Jan	1st submission	7	7	7	7	0
3–Apr	2nd submission	7	7	7	7	7
15–May	quality of submission	10	10	10	10	5
30–May	final meeting	2	0	2	2	2
	Total for Project	35	33	35	28	21
	Calculate %	100%	94%	100%	80%	60%

Notes: (1) This activity chart should be maintained by the team leader of the group and submitted at the end of the project.

(2) The group leader/ group members should decide the date they want to meet or the deliverable that is due on that date.

(3) The group members present or the majority then should decide on the weight to give to that activity/ deliverable. You might decide by simple majority that meeting on the date decided is worth 2 points, but submitting the part required is worth 10 points. Similarly, you can decide that the quality of work deserves 10 points.

(4) For every meeting/deliverable, team members should decide what each team member deserves. At the end of the semester, all the points would be added up and the percentage calculated. The student's individual grades will be a percentage of the group project.

(5) In case of disputes about the points each team member deserves, a simple majority should be used.

Understanding grading for this group
If the group earns 100 points for the group project, Cartman would receive only 60% of the group grade, but Kenny would get 100%.

TABLE 2
COMPARISON OF METHODS TO CURB SOCIAL LOAFING

Method	Feedback Timing	Student Learning About Working in Groups	Faculty Time Commitment	Ease of Implementation	Severity of Confrontation	Confrontation Responsibility	Expected Impact on Social Loafing
Anonymous peer review	Only at end	Medium	High	Easy	Low	Faculty	Identifies at the end
Multiple peer review	Continuous	High	Very High	Easy	Medium	Students and faculty	Prevents
Firing method	Only at end	Low	Low	Easy	High	Faculty	Identifies at the end
Divorce method	Only at end	Low	Low	Easy	Low	Faculty	Identifies at the end
Extensive handholding	Continuous	Low	Very High	Difficult	Low	Faculty	Prevents
Diary method	Only at end	Medium	High	Easy	High	Faculty	Identifies at the end
CAPR	Continuous	High	Low	Easy	Medium	Students	Prevents

Empirical Validation of CAPR System

An empirical test of the proposed system serves to determine the efficacy of CAPR. This experiment includes 88 undergraduate students majoring in marketing at a medium sized southern U.S. university, enrolled in two sections of *Principles of Marketing*. Both sections were taught by the same instructor, and both sections required a marketing project report to be submitted at the end of the semester for credit, worth 20% of the overall grade. Only one section used the CAPR system (n = 46; number of groups = 13); in the other section, students received no instructions about how to conduct their group work, so they developed their own mechanisms to ensure group cohesion (n = 42; number of groups = 11). We hypothesize that students following the CAPR system should indicate higher satisfaction with the overall experience of working in groups.

The test of satisfaction involved a short, anonymous survey that the students completed at the end of the semester, after submitting their completed project, in which they documented their experience with the group project. Multi-item scales measured their satisfaction with four important issues: group meeting ease, group work dynamics, group work outcomes, and expected grading satisfaction. These constructs and their underlying items were derived from a separate study with 15 different students in a previous semester. In this pretest, the students, as a group, listed in their own words the elements they would look for in a successful group project. We gathered these responses and categorized them into the four constructs, which we defined as follows:

Group Meeting Ease: The ease of organizing the student groups. Most students felt that getting students together to meet was one of the biggest challenges of group work.

1. *Group Work Dynamics:* How the group conducted itself after it formed. Students felt that groups in which all students did their individual parts on time and as they were supposed to do them performed well.
2. *Group Work Outcome*: Overall satisfaction with the group work. This type of satisfaction was measured directly, as well as by items that denoted satisfaction obliquely. For example, whether the students would want to work with the same group again provided an indication of satisfaction. Students also expressed strong feelings that equal participation from individual group members was an important part of overall satisfaction.
3. *Expected grading satisfaction*: The perceived satisfaction with the grading process. Students wanted a process that was fair and distributed grades fairly to each individual, according to his or her work.

With the responses from the pretest, we generated items for the constructs. We checked these items for

content validity and face validity by sharing the items with the same students to ensure they agreed with the wordings and their meanings. The changes suggested by the students were incorporated into the final refined scale. We tested the reliability of the scale during their application during the actual survey. The means and reliabilities of all scale constructs appear in Table 3.

All the Cronbach's alphas are greater than 0.85, in support of high reliability. We also conduced discriminant validity checks using a confirmatory factory analy-

TABLE 3
SCALE CHARACTERISTICS

		Mean	Standard Deviation	Cronbach's Alpha	Composite Reliability
	Group Meetings Ease	**4.835**	**1.822**	**.868 (.776*)**	**0.9325**
1	It was easy to get members to show up for group meetings	5.02	1.775		
2	All group members showed up for group meetings always.	4.65	2.09		
	Group work dynamics	**5.602**	**1.622**	**.940**	**0.924**
3	All group members did the work they were supposed to	5.76	1.597		
4	All members submitted their work on time	5.48	1.748		
5	It was **NOT** very hard to get group members to submit their work	5.43	1.799		
6	We did **NOT** ever feel the need to fire a group member	5.74	1.897		
	Group work outcomes	**5.409**	**1.542**	**.903**	**0.779**
7	All group members submitted quality work.	5.72	1.597		
8	All group members contributed equally	5.14	1.972		
9	I was totally satisfied with the group work	5.30	1.913		
10	I learned a lot doing this group project	5.57	1.522		
11	If I had a chance to do it again, I would choose the same group	5.33	2.027		
	Expected Grading Fairness	**5.488**	**1.858**	**.915 (.844*)**	**0.536**
12	All group members in this group should be graded equally	5.45	1.971		
13	I do think the rewards for this group work will be fairly distributed amongst members	5.52	1.900		

• Complete data set considered to calculate values.
* Correlation value between items.

TABLE 4
DISCRIMINANT VALIDITY: AVERAGE VARIANCE EXTRACTED AND CONSTRUCT CORRELATIONS

	1	2	3	4
Group meeting ease **(1)**	**0.9348**			
Group work dynamics **(2)**	0.6195	**0.8685**		
Group work outcomes **(3)**	0.4542	0.6154	**0.6541**	
Expected grading fairness **(4)**	0.4299	0.5887	0.3758	**0.63**

* The square root (average variance extracted) is on the diagonal, and the construct correlations are below the diagonal.

sis, to ensure that constructs were distinct from one another and that the scale items loaded exclusively on the underlying construct. We tested for discriminant validity using the method suggested by Fornell and Larcker (1981); that is, discriminant validity exists if for each construct, the square root of the average variance extracted is greater than the correlation between that construct and all other constructs. All constructs passed this test (Table 4). The average scale items for both groups provided the group means for comparison, using independent t-tests. Table 5 summarizes the findings using mean differences.

The presence or absence of the CAPR method did not appear to affect the ease of organizing group meetings, though the group that used CAPR indicated a higher, though not significantly different, mean. The students also recalled the number of meetings in which they participated over the course of the semester; students recalled having more meetings under the CAPR system than otherwise. However, this difference was not significant.

Similarly, the group work dynamics construct, which measures internal group workings, indicated no significant differences, though the mean of the CAPR group again was higher than that of the other group. Significant differences emerged between the groups with regard to group work outcomes (p = .026), such that the students in the CAPR group achieved higher reported group work outcomes (m = 5.756) than did the other students (m = 5.0286). Overall, students who used CAPR appeared much more satisfied with the outcome of the group project.

Finally, the expected grading fairness construct measured whether students felt comfortable with the grading and believed rewards would be shared fairly. The groups

TABLE 5
SUMMARY OF MEAN DIFFERENCES

	CAPR (n = 46)		Non-CAPR (n = 42)		Mean Difference	*p*-value	Significance
	Means	**S.D**	**Means**	**S.D**			
Organizing group meetings	5.130	1.61	4.511	1.99	0.619	.112	Not Significant
Group work dynamics	5.760	1.41	5.428	1.82	0.332	0.340	Not Significant
Group work outcomes	5.756	1.02	5.0286	1.90	0.7274	.026	Significant
Expected grading satisfaction	5.989	1.30	4.940	2.20	1.049	.007	Significant

that used the CAPR system expressed more satisfaction with the expected grading fairness than did the control group (m = 5.989 versus 4.940), with a highly significant difference (p = .007). This result supported the instructor's personal experience regarding the number of the complaints received (or lack thereof) about social loafing at the end of the semester. In the section that used the CAPR method, no complaints resulted, whereas in the other section, three students complained to the instructor that they had done the bulk of the work and wanted the grades of social loafers reduced.

The data analysis indicates that though the CAPR system cannot increase the number of meetings or make it easier for groups to ensure all students show up and participate, it is associated with an increase in students' satisfaction with the outcome and expected grade fairness. The data thus demonstrate that the CAPR method offers a viable method for reducing social loafing in group project environments.

Implementation Issues

The CAPR method works very well if the instructor follows up with the groups every two weeks, at the time the group contact brings the contact sheet in to obtain the instructor's initials. Our experience shows that initially, chronic social loafers miss some meetings. However, once these students realize that the instructor has identified them as potential social loafers and that failing to complete their group work will reflect negatively on their grade, the social loafing generally ceases quite early. In our implementation, we took note of who the likely social loafers in the group were and gently reminded them that we knew about their performance, so they should try to improve. This gentle one-to-one reminder generally has worked quite well in halting social loafing. In a sense, the use of CAPR allows faculty members to use a simpler version of the faculty intervention method, even in large classes.

Yet some issues remain that should be considered when implementing CAPR. In our usage of CAPR in the past two years, we have found that whenever we use it as a method to evaluate group participation, group members appear very hesitant to use quality as a judgment criterion. The main criteria on the evaluation sheets are attendance at meetings and on-time submission. This outcome suggests that student aversion to confrontation remains strong. Moreover, allowing students to determine the weight and content of deliverables can lead them to incorrect choices. A better method might be to suggest students use a deliverable and weighting schedule developed by the instructor as a template. Therefore, students would be graded on criteria that are both relevant and effective. It also would ensure that all the groups are graded on similar criteria, to better support the fairness criterion.

We also note that because the evaluations are not anonymous, students could be under pressure to be nice to their fellow group members, especially when it come to evaluating one another. This pressure could explain why students seem so reluctant to include the quality dimension as a deliverable on their evaluation sheets.

Limitations and Future Directions

This study also suffers from some limitations. The research method evaluates the CAPR method in comparison with a control group, so the only claim well supported by the empirical findings is that the CAPR method works as designed. That is, it is associated with perceptions of better group outcomes and greater satisfaction with group work. The study cannot assert that CAPR is the best method for curbing social loafing. Although the CAPR method has certain strengths (ease of use), it also entails some weaknesses (total reliance on students). If time is not a constraint for the instructor, extensive handholding or even multiple peer evaluations might work better than CAPR. The empirical findings also might have been affected by factors outside our control, such as the grade point averages of the individual students, the hours of work they put in, and the personality of the members of the groups, all of which could have acted as covariates. Researchers should include these covariates in a model to test the effectiveness of CAPR further. Additional research could test each method comparatively, using various factors, to determine the best method to curb social loafing. Finally, this study features a limited sample size that limits the generalizations possible from our findings.

CONCLUSION

This paper proposes a new system, CAPR, to reduce the incidence of social loafing in group work. In detailing how the system works and sharing the results of an actual test of the system, we demonstrate that the CAPR system not only is associated with reduced incidence of social loafing but also may lead to better group outcomes. Although CAPR increases satisfaction with grading fairness, it cannot improve substantially the number of meetings held or the group work dynamics. Therefore, its usage may be limited to universities and colleges in which students live in close proximity. The CAPR method also may be unsuitable for online courses, in which context it has little chance of increasing the frequency of meetings. However, in traditional coursework, instructors can easily incorporate the CAPR system by using the provided evaluation sheet or modifying the sheet for their particular circumstances. The key is to talk about social loafing from the very beginning of the course and let students know that the CAPR method is designed to evaluate the process of

group work, as well as the group's final output. As we mentioned previously, the CAPR method is no silver bullet to prevent all social loafing, and thus instructors must use their judgment to tweak the system to suit their circumstances. Instructors also are encouraged to adapt the proposed system in their respective classes as a potential means to improve the quality of group work by students and the benefits they obtain from it.

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