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# A Flip of the Coin-A Roll of the Die: An Answer to the Free-Rider Problem in Economic Instruction 

Robin L. Bartlett

Economic instructors often put students into small groups to research an economic issue, to work through a hypothetical problem, or to prepare a class presentation. No matter how well structured the exercise and the group, there are always free-riders-students who do not participate to the best of their abilities. Thus, the outcomes of student work groups can be disappointing for the instructor and frustrating for students. In this article, I offer a solution to the free-rider problem encountered in group work by adding an element of chance to cooperative learning groups.

## COOPERATIVE LEARNING

Over the past two decades, David W. Johnson and Roger T. Johnson, along with many collaborators, have pioneered the concept of cooperative learning and have tested its effectiveness compared with individual and competitive learning environments. ${ }^{1}$ In cooperative learning environments, students work in a structured group to perform a well-defined task or to understand a particular concept. A student's grade depends not only on how well he or she understands the material or completes the task but also on how well other members of the group do the same. In contrast, in individual learning environments, students strive to achieve a certain level of competence or skill on their own. Their success does not depend on the success or failure of other students. For example, an economics instructor awards an A to any student who gets 90 percent of the questions on a test correct or completes 90 percent of an assignment. In competitive learning environments, although students do the work by themselves, their success or failure depends on the success or failure of other students. Here, an economics instructor might award A's to only the top 5 percent of the class. Individual and competitive learning environments, as demonstrated by traditional lecture and grading schemes, are preferred by most instructors of economics.

The purpose of a cooperative group is to ensure that every individual within the group develops her or his academic and social skills to the maximum. The research reviewed by Johnson, Johnson, and Smith (1991) on cooperative learning

[^0]environments suggests that this is the case. Cooperative learning environments have been shown to be better learning environments than individual or competitive ones. Students learn more and learn more effectively. Moreover, students become more involved in the subject and thus tend to have a lower attrition rate. Women and students of color find cooperative learning groups more conducive for learning (Belenky et al. 1986; Cooper, Robinson, and McKinney 1994; Musil 1992; and Treisman 1992).

Cooperative learning is a subcategory of active learning (see Meyers and Jones 1993) and can be used to perform any educational task. Students are put into groups of two to four and are given roles to play within the group. Three basic types of groups exist: formal, informal, and base. Members of formal learning groups are selected by the professor and are in business for the length of time necessary to perform a specific educational task-research a paper or prepare a class presentation. If an instructor assigns a group of students to investigate the administration's fiscal policy or a local school board's financial options for a new school building, they work together until completion of a final presentation or paper. Informal groups are short term and are used to clarify or reinforce points made in a lecture or after a classroom exercise. An instructor may stop for five minutes partway into a lecture on the law of demand and again at the end of the lecture to allow students time to check and summarize the major points of the lecture with the two or three students sitting around them. Base groups are formed for the duration of the term to do assignments and serve as a support group for members. Here an instructor may assign a series of position papers, reports, case studies, or simulations and have the same students work together throughout the term. Base groups may be formed by either the instructor or by the students themselves.

Within groups, each student may play a variety of roles throughout the term. One student may be the recorder, documenting the group's discussions. At a later date, that same student may be the checker, making sure that everyone in the group understands the group's work. Another student may be the encourager, helping to motivate and to be supportive of individual efforts. Finally, one member may serve as an elaborator, making connections between the group's past and its present work. Unlike individual and competitive learning environments, cooperative learning is also intended to develop a student's social skills and group processing skills. Without the structured academic role, task assignments, and opportunities to develop social and group skills, a group of students is not necessarily a cooperative learning group.

## THE ELEMENTS OF COOPERATIVE LEARNING

Cooperative learning is defined by five elements: positive interdependence, face-to-face promotive interactions, individual accountability, social skills, and group processing. For cooperative learning to work as planned, each of the five elements must be in place. The first element of cooperative learning is positive interdependence; that is, a student's success is dependent on the success of other students in the group. Positive interdependence can be structured by having a
common goal, shared resources, shared rewards, and complementary roles. A student works with a group of students to solve a problem, research an issue, or study for a test. The success of one student depends on the success of all. The instructor develops and distributes different materials to different students, forcing students to share and cooperate. The development and orchestration of group activities require a great deal of preparation.

The second element is face-to-face promotive interaction; that is, a student actively promotes the learning of another student by encouragement, concern, and most important, feedback. For students to have face-to-face interactions with each other, time needs to be set aside in class or out of class for the interaction to occur. Economics instructors would be willing to give up lecture time if they knew that students learn more from the interaction than they lose from the shortened lecture. Johnson, Johnson, and Smith $(1991,87)$ report on several studies that show lectures are a relatively ineffective way to promote learning. They note that the attention of even the best medical students peak after 15 minutes of the lecture. Moreover, lectures are the preferred mode of learning only for a few above-average students with auditory learning preferences. Setting time aside for a cooperative learning exercise does not necessarily mean that less material is covered. More material may be covered outside of class versus during class.

The third element is the most important element and the most problematic element of cooperative learning-individual accountability or avoiding the free-rider problem. Various methods have been tried to ensure that individual students work up to their capabilities. In formal groups, a student might receive the grade he or she deserves on a test and bonus points if other members of the group reach a minimum, or cut-off, level of understanding. The student receives feedback on the performance of other individuals in the group as well as his or her own. Peer pressure is brought to bear on those who are not pulling their weight in the group or those who are not doing their best. In informal groups, the instructor may call upon one member of the group to stand up and to review the group's discussions and put forth their conclusions. But who is to say which student stands up?

Each student's input into the group effort needs to be monitored. One way to monitor student input is to have other students evaluate a student's work. Then, of course, the instructor must evaluate the evaluation, so the amount of grading or feedback escalates.

The problems with individual accountability in cooperative learning groups is related to how much weight the cooperative learning component has in the student's final grade. It is difficult to weigh the cooperative learning component heavily when it is difficult to determine how much an individual contributed to the group's success. At the same time, not counting the cooperative component heavily in the grading process lessens a student's motivation and increases a student's willingness to free-ride. Weak and strong students who do not work up to their potential are free-riders. The existence of the free-rider problem is the biggest negative cost associated with cooperative learning. Effectively addressing the free-rider problem is the key to the success of the group's efforts and to its adoption as a viable teaching alternative to lectures.

The fourth and fifth elements of cooperative learning are ones that deal more
with social skills. Exercises where students learn more about other members of the group and how to get along with each other are devised. Beside learning how to deal with the problems of orchestrating group efforts, finding time for group meetings, and monitoring individual contributions to avoid free-riders, economics instructors have to learn how to teach social and group processing skills and be willing to use them. In the traditional cooperative learning environment, most of the responsibility for the success of the group is the instructor's. The question is how to shift the responsibility for learning to the student and make cooperative learning a viable teaching alternative for instructors of economics.

## A FLIP OF THE COIN

Adding an element of chance to a cooperative learning group eliminates the free-rider problem. Making individual students accountable then shifts the responsibility of orchestrating resources and roles, finding time for groups to meet, and developing social and group processing skills from the professor to the student. Thus, incorporating cooperative learning into an instructor's repertoire of teaching techniques does not necessarily have to radically change how economics is currently taught. Two changes are necessary. First, students would be allowed to voluntarily form their own cooperative groups (two to six students each). Second, one student would be randomly selected from the group to perform each of the assigned educational tasks. The cooperative learning group would then be transformed into a team. The team's success would depend upon their collective efforts. As in any team situation, they would be as strong as their weakest link. A flip of the coin or a roll of the die will decide who takes the exam for a team. On exam day, students who voluntarily chose to go it alone would take the exam as usual. Students who voluntarily chose to work as a team would go through a random selection process to determine who would take the test. Stronger students would no longer be doing the work for the group. Stronger students would now be motivated to teach weaker students. Weaker students would be much more motivated to learn because the odds may go against them. If they are lucky, however, the stronger student gets selected.

The corollary problem of how to weigh the team's efforts also disappears. The grade earned on a test taken by a randomly selected team member is given to each member of the team. Although individual instructors may vary the weight given to team efforts versus individual efforts in the final grade, the cooperative component must weigh heavily into the calculation. Students could even be given the option at finals as to whether or not they should stay together. If the team pedagogy works as hypothesized, either choice will yield the same result-each student would have developed academic and social skills to the maximum. Better students learn concepts more thoroughly and weaker students gain confidence in their abilities.

An underlying assumption of this approach is that most students, if properly motivated, can learn most college-level material. Another assumption is that until a student communicates her or his understanding of an idea to another person (student or faculty) real learning does not take place. Both stronger and weaker
students benefit more from a collaborative learning environment by adding an element of chance.


#### Abstract

A TRIAL RUN Theorizing about the benefits of putting students into teams is easy. Putting teams into operation is risky without adequate preparation. During the spring semester of 1993-94, in an honors section of "Clintonomics," the team concept was introduced. The class was composed of freshmen, sophomores, juniors, and seniors. The first day of class time was spent outlining the course and introducing students to the notion of team learning. Students were given two exercises to allow them to feel the difference between individual and competitive learning and team learning environments. The first exercise, a word scramble, was used to simulate an individual and competitive learning environment, and the second exercise, a counting problem, was used to simulate a team learning environment. ${ }^{2}$ The class started with a brief 15 -minute introduction to Clintonomics and a discussion of course requirements. After about 15 minutes, a test was distributed face down to each student. The test was a word scramble of 10 words used in the previous 15 minutes. Students were instructed not to turn over the test until signaled. On cue, they were instructed to turn over the test, read the instructions, and begin. The instructions indicated that they had 5 minutes to unscramble the 10 words. To heighten the tension of the experience, the instructor wrote each passing minute on the board and then announced it. When the 5 minutes were up, students were instructed to put down their pencils, turn over their tests, and look forward. An answer sheet was distributed, and students were asked to grade the paper of a person sitting next to them. When the papers were graded and returned, students were asked to raise their hands when the number of correctly unscrambled words they had gotten right was announced. As anticipated, no one had all of the words correctly unscrambled. When the number six was called, one student raised his hand. Needless to say, the other students moaned. The student who raised his hand was given lots of praise. The other students were chastised for not having listened more closely to the previous 15 -minute lecture in which all the words to be unscrambled were mentioned.


To process the experience, students were asked to answer the following questions: How did you feel about the person who raised his hand first? How did you feel about your own performance? What did you learn, if anything, from the experience?

After the debriefing, students were asked to form their own groups of two or three students for the next exercise. Students tended to pair off by picking the student sitting next to them. Then the problem-solving exercise was passed out. This exercise asked students to determine the number of triangles in a picture by developing a system for counting them. The members of the team were to raise their hands when everyone in the group was confident that he or she could explain the group's answer and how they had arrived at it. Although not explicitly stated, students had as much time as they needed to do the exercise. The exercise took 10 minutes.

Within 2 minutes, the atmosphere of the classroom was completely transformed. Students were talking with each other and getting excited about the task. When the members of a team raised their hands, they decided who was to be "heads" and who was to be "tails." A coin was then flipped and the student whose declaration matched the side of the coin that appeared went to the front of the class. The student began by stating the number of triangles in the picture and then explaining to the class how the group had finally decided upon the answer. During the explanation, the selected team member could not receive any help from his partner. If mistakes or inconsistencies were noticed by members of other teams, the student had to sit down and all of the groups went back to work. The teams kept working until one team successfully convinced the other teams that their answer and rationale were correct.

At the end of the exercise, students were given another set of debriefing questions. They were asked how they felt when the members of the first team raised their hands. How did they feel about the learning experience? How did they feel about their team's performance? What had they learned, if anything, from the experience? Finally, they were asked how he or she could have helped the team more.

After both exercises were completed, students were given the option of doing all of the course work alone or as a member of a team. If they chose to be on a team, they would work as teams throughout the semester. Tests and presentations would be done by one randomly selected team member. Teams would be treated as a unit. Although teams could not disband during the semester, teams could always form.

The next day, two groups of 2 students committed themselves to a team. Both teams were composed of a male and a female student. Thus, the semester started off with a class consisting of two teams of 2, and 9 individuals-a total of 13 students. The day of the first hourly exam, everyone showed up for class. Individual students were given the test. The test taker for the two teams had to be decided. A flip of the coin answered the question. Interestingly, the team members who were not selected stayed around to encourage the other team member. One student was overheard telling another student that she knew he could do it. The tests were graded anonymously and returned the next day. A team of 2 freshmen had the best grade. The other team was in the middle of the pack. After the tests were returned, two women decided to form a team.

After the second hourly exams were returned, a member of the recently formed all-female team complained that she could have done better than her partner had done. She and her partner were invited to schedule a group discussion. They both came back the next day. A productive discussion about how to study and work together followed. As fate would have it, at the third hourly exam, the complaining member of the all-female team was selected to take the exam. She did an excellent job answering two of the three questions on the test. Unfortunately, she failed to read the instructions properly and did not select a third question to answer. Learning from both of these experiences, the all-female team received one of the highest grades on the final.

## EVALUATION

At the end of the semester, standard departmental student evaluation forms were administered. Team members were encouraged to react to their experiences on a separate piece of paper. On the standard departmental evaluations, students on average rated the course 4.2 and the instructor 4.2 , on a scale ranging from 1 (lowest) to 5 (highest). The departmental averages for courses and instructors at the introductory level that semester were 3.6 and 3.9 , respectively. The universitywide averages for courses and instructors for all courses were 3.8 and 4.1 , respectively. Because the evaluations were anonymous, it could not be determined if team members rated the course and the instructor higher than other students. In addition, the average grades of team members and individual students were not statistically different.

Specific comments from the six team members in the class were instructive.
I found that working as a team helped me learn more than I would have otherwise. My partner and I were very compatible and studied together very effectively. When one of us did not understand-the other could explain. Sometimes I had notes on something he did not and vice versa. Also I think our partnership worked because we were friends and could work around each others schedules. The pressure of having another person's grade on your shoulders also helped push us to study. . . .

I really liked the team concept. I think that I studied much more than I would have had I not been on a team. It took a lot of courage to let someone else determine my grade, but since I was responsible for what they knew, and they were responsible for what I knew, we taught each other and learned more. . . .
The idea of a team seemed pretty radical at first, but it ended up allowing me to learn the material more thoroughly and listen to other perspectives by discussing it with my teammate. Also, we pushed each other to learn the material because our own grade was at stake.

I liked being on a team for the most part. I felt cheated when I felt I could have done better on a test than my partner did. However, being on a team makes a person more responsible which is good. You are responsible for you and your partner's grades. It was also good because you must make sure you knew what was going on in case your partner doesn't.
I recently had a bad experience with working in groups, but this class has reaffirmed my faith in groups.
One student who was not on a team made the following comment on her final:
Now that I am really finished with the classroom aspect of the course, I wish I had participated on a team. I feel I had logical reasons for my choice. . . . Granted my method may not be the best way (waiting until the last minute), and in some ways I think being on a team would have taught me discipline. Another factor was that I didn't really know very well the people in my class. . . . I'm sure everyone in the class is intelligent, and being on the team would have helped me gain social skills in meeting and getting to know someone I didn't know well at first.

These comments reveal that the team learning environment as reported by students themselves potentially improves both their academic and social performance. The advantages of being on a team as articulated by these students were several. First, an increased sense of responsibility motivating them to come to
class more often, take better notes, and to study harder outside of class. Second, students felt they had learned more than they would have otherwise. Some students, particularly the younger students, felt that getting to know another student well was a positive intellectual and personal experience.

## SUMMARY AND DISCUSSION

Pedagogically, the team is a variant of cooperative learning groups as described by Johnson and Johnson (1974). Adding the element of chance-the flip of the coin-turns an artificially constructed group learning experience into one that reflects team learning experiences in the business world. The five elements of cooperative learning are still present. Students are developing and orchestrating some of the elements, rather than the instructor. Positive interdependence exists. Students still have a common goal, share the reward, share resources, and fulfill different roles within the group. Although the instructor defines the task, students are left to their own negotiations to decide how resources are shared and roles distributed. Face-to-face interaction still occurs. Although some time may still be allotted during class time, most of the face-to-face time occurs outside of the classroom. Free-riding is eliminated. In the strictest sense, students are accountable not only for their own grade but also for that of others. If a student fails, the others fail too. The motivation factors become a sense of responsibility and the desire to learn rather than peer pressure and grades per se. Students will find themselves teaching and learning from each other. Good students will learn more, and poor students will get more individual attention. In addition, with the help of a few guidelines, students will develop social and group processing skills on their own.

Teams can easily be used in large and small classes. In large classes, selfselected teams of up to six students would markedly reduce the amount of grading necessary and increase the amount of learning taking place. In small classes, selfselected teams would help class discussion. In addition, more vulnerable students, students who are different from the classroom norm in some way, who have a way of getting lost in a crowd, would have a way of making connections with other students and developing an intellectual and social support group to help them learn the material. Students of color, women, or international students may find teams a viable alternative to learning alone.

A second trial occurred during the fall semester of 1994-95. Students in two sections of introductory economics were offered the opportunity to form teams. On the first day, students were given the individual and team learning exercises described above. On the second day, they formed teams. The first section formed nine teams ranging in size from two to three students. Six students chose to go it alone. In the second section, six teams were formed ranging in size from two to five. Nine students chose to go it alone. Beside taking hourly exams, teams worked and reported on problem sets. The hourly exams were processed as described above. The Monday problem sets were processed differently. Student names were pulled from a bowl. If the student was working alone, he or she answered the question. If a student was working as part of a team, then a member
of the team randomly selected answered the question. For the final, teams were allowed to decide whether to stay together as a team or to take the test individually. Adding an element of chance, a flip of the coin or a roll of the die, seems to be an acceptable way to have students take more responsibility for their own learning and that of others.

## NOTES

1. For a complete review of the work of Johnson and Johnson and others in this field, see Johnson, Johnson, and Smith (1991). All empirical claims, unless noted otherwise, were cited in the above work.
2. These examples were demonstrated by Francis Maher at the New England Regional Seminars at Wellesley Center for Research on Women at Wellesley College, 1983-84.

## REFERENCES

Belenky, M. F., B. M. Climchy, N. R. Goldberger, and J. M. Tarule. 1986. Women's ways of knowing. New York: Basic Books, p. 118-23.
Cooper, J. L., P. Robinson, and M. McKinney. 1994. Cooperative learning in the classroom. Changing college classrooms, ed. D. F. Halpern and Associates. San Francisco: Jossey-Bass, p. 74.
$\rightarrow$ Johnson, D. W., and R. T. Johnson. 1974. Instructional goal structure: Cooperative, competitive, or individualistic. Review of Educational Research 44 (Spring): 213-40.
Johnson, D. W., R. T. Johnson, and K. A. Smith. 1991. Cooperative learning: Increased college faculty instructional productivity. ASHE-ERIC Higher Education Report No. 4. Washington, D.C.: The George Washington University, School of Education and Human Development.
Meyers, C., and T. B. Jones. 1993. Promoting active learning: Strategies for the classroom. San Francisco: Jossey-Bass.
Musil, C. M. 1992. Collaborative learning and women's ways of knowing. Students at the center feminist assessment. Washington, D.C.: Association of American Colleges: 55-57.
$\rightarrow$ Treisman, U. 1992. Studying students studying calculus: A look at the lives of minority mathematics students in college. The College Mathematics Journal 23 (5): 362-72.

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