

Grading Cooperative Projects¹

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[Chapter Description -- Background, rationale and strategies for grading group projects. Fairness of group grades. Formats and procedures for combining individual and group grades. Successes and challenges with group grades.]

The assignment and subsequent grading of cooperative group projects requires creating and nurturing an environment in which the conditions for the joint project work and the requirement of a single product are carefully integrated and are seen as fair (and we hope beneficial) by the students. Many students have had unpleasant experiences working on poorly structured group projects. A common problem is that the workload is very uneven and some students do most of the work while others do very little. Another common tension in group project work is the students' perceptions of how good is "good enough" as these views typically vary widely. Many of these problems can be eliminated through the use of carefully structured groups and by building quality into the process through the use of diagnostic and summative assessment. In essence, we must build quality into the process before assigning and grading cooperative projects.

Keys to Success in Assigning and Grading Cooperative Group Projects

The key to success in using cooperative group projects is to prepare yourself and the groups. The most important thing faculty can do to minimize problems in grading cooperative projects is to carefully structure the five basic elements of formal cooperative learning groups — positive interdependence, individual and group accountability, face to face promotive interaction, teamwork skills, and group processing. The professor's role in this process is first and foremost to make sure there are good reasons for the cooperative group work — complex task, multiple perspectives, divisible responsibilities, etc. — that there is sufficient time, that students possess the necessary skills and experience for successful group work, and that the instructional goals indicate a cooperative group. If several of these conditions are met, then there is probably sufficient reason to use a formal cooperative learning group. The professor's role in using formal cooperative groups involves the following steps:

1. Specify the objectives for the lesson
2. Make a number of instructional decisions
3. Explain the task and the positive interdependence
4. Monitor students' learning and intervene within the groups to provide task assistance or to increase students' teamwork skills

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5. Evaluate students' learning and help students process how well their group functioned

The basic elements and professor's role are presented in much greater detail with numerous examples in "Cooperative learning for the new college teacher" (Smith & Waller, 1997), "Cooperative learning: Making 'groupwork' work" (Smith, 1996) and "Active learning: Cooperation in the college classroom" (Johnson, Johnson & Smith, 1991).

Criterion-Referenced Assessment of Cooperative Group Projects

An underlying foundational requirement for successful use of cooperative learning is criterion-referenced assessment. Assessment is often done using a norm-referenced grading or "grading on a curve" rather than criterion-referenced grading or an "absolute grading scale." In a norm-referenced grading scheme students are compared with one another, lined up so to speak, and given grades A-F relative to one another. In this scheme, no matter how good or poorly the students do in an absolute sense, there are fixed percentages of each grade category (10 percent A's for example). In a criterion-referenced grading scheme, absolute criteria are set (90% for an A, for example) and anyone and everyone who meets or exceeds this criterion get that grade. In this scheme it is possible for everyone (or no one) to get an A.

Norm-referenced grading is often assumed to be the "norm" in higher education, but a national survey conducted by Astin (1993) indicates only about 22% of all faculty grade "on the curve." He noted that engineering faculty have the highest percentage use of this scheme (43%), but that it is not used by the majority.

One of my favorite comments on norm-referenced grading schemes was presented in the book "Making Sense of College Grades":

It is not a symbol of rigor to have grades fall into a 'normal' distribution; rather, it is a symbol of failure--failure to teach well, to test well, and to have any influence at all on the intellectual lives of students (Milton, O., Pollio, H.R., and Eison, J.A. 1986. Making sense of college grades. San Francisco: Jossey-Bass, p 225)

The use of criterion-referenced evaluation is absolutely essential in classes where a high level of student cooperation is structured (group projects, for example). There is nothing more destructive than asking students to work together on projects (and perhaps share a grade) and then pit them against one another by grading them on the curve at the end. One of the most common reasons that cooperative learning, or more broadly, group work, fails is that faculty put students in a fundamentally incompatible situation -- working together cooperatively and being pitted against one another at grading time. Perhaps this high percentage of "grading on the curve" is why many faculty have difficulty using cooperative learning.

Use a Variety of Diagnostic and Formative Assessment Formats

Grading student's projects is a summative assessment process. Faculty can ease the pain

associated with grading students projects by building in diagnostic and formative assessment.

We can learn a lot about students when they enter a course by having them complete a Student Information Form. In my courses students complete a “course information form” on the WWW during the first week that surveys their expectations and motivations for the course and checks on their background and preparation. The results for previous coursework for a freshman engineering course (CE/Geo E 3700) for Fall, 1996 were:

Level*	Probability	Statistics	Linear Algebra	Calculus	Analysis	Modeling
1	14	21	10	3	17	28
2	8	3	0	2	1	0
3	4	4	3	5	8	2
4	6	2	4	13	4	0
5	1	0	13	7	0	0

*Key: (1) I have never had a course in this area, (2) I had a course, but don't remember much, (3) I had a course and remember some of it, (4) I had a course and remember most of it, (5) I had several courses and remember most of them.

Similar results were collected for computing experience for Fall, 1996:

Level*	Graphing Calculator	E-mail	Spread-sheet	Word Processor	Statistical Package	Program Language	Computer Algebra
1	1	3	4	0	26	12	22
2	2	11	11	0	2	9	6
3	8	4	14	6	0	7	1
4	19	12	2	24	0	2	1

*Key: (1) I never have used one, (2) I know a little about them, (3) I have used them some, (4) I am very comfortable using them.

Seven students were most familiar with Mac and 23 with IBM compatible. Three reported that this is the first time they used the WWW, 13 said they used it a few times, 12 said they could find their way around fairly easily, and two said they had their own web page.

An end of the course review form is completed by each student on the WWW. All aspects of the course are surveyed and this information is considered in revising the course for subsequent offerings. We also, of course, administer a standard Student Evaluation of Teaching form.

Another level of diagnostic assessment is building quality into the class through the use of

continuous improvement processes, such as a Student Management Team. A student management team is used by many faculty to operationalize Total Quality Management principles. The attributes of student management teams are described below, and the operation of the team is based on shared responsibility:

Students, in conjunction with their instructor, are responsible for the success of any course. As student managers, your special responsibility is to monitor this course through your own experience, to receive comments from other students, to work as a team with your instructor on a regular basis, and to make recommendations to the instructor about how this course can be improved.
(Nuhfer, 1990-1995).

Typical attributes of student management teams include:

- 3 - 4 students plus professor (I have had teams of up to 12 members in classes of 80).
- Students have a managerial role and assume responsibility for the success of the class.
- Students meet weekly; professor attends every other week. Meetings generally last about one hour.
- Team meets away from classroom and professor's office.
- Students maintain log or journal of suggestions, actions and progress.
- Team may focus on the professor or on the content.
- Team utilizes group dynamics approach of TQM.

The members of the student management team meet weekly and distribute the minutes of the meeting via e-mail to the teaching team, and when appropriate, to the entire class. Members take turns facilitating the meeting and recording the minutes. A representative of the team reports to the class each week.

Many problems typically encountered by faculty using groups may be eliminated or lessened through careful structuring of the groups and the expectations. Carefully designed assessment plans also lead to success.

Assessment of Cooperative Group Projects

There are three principal phases -- before, during and after the lesson -- in the design of assessment plans for cooperative group projects.

Prior to the lesson the evaluation criteria must be developed, criteria such as those listed in the sample rubrics. Be sure to inform students of the criteria, preferably in syllabus. Plan how to collect information on students' progress. Define the process of learning, especially the number and type of iterations permitted on the student's work.

During the lesson, observe and sample groups, interview individual students, and collect interim group products or informal products such as "minute" papers.

Following the lesson, collect the group product and evaluate it using the format and rubrics outlined before the lesson.

A single product, such a group report, is a common part of cooperative group work. The procedure I use for reviewing (and grading) cooperative group projects is a table such as the one reproduced below. A copy of this form is included in the syllabus along with specific suggestions for things to include in each section.

Group Project Report Evaluation Form

Category	Possible Points	Points Received	Comments
Executive Summary	20		
Problem	10		
Method	10		
Results	20		
Discussion	20		
References & Appendix	10		
Organization Cover Page Table of Contents	10		
Total	100		

In addition to using a clearly defined grading form such as the one listed above, it is also important to provide rubrics indicating what you're looking for in each of the categories. This information is included in the syllabus in my courses.

A simple, dichotomous scale for evaluating writing from Moss and Holder, 1998 is presented below:

Dichotomous scale for evaluating writing

	YES	NO	
SUBSTANCE	___	___	1. Paper addresses the issue.
	___	___	2. Paper has a focus, central idea.
	___	___	3. Paper develops major aspects of the central idea.
	___	___	4. Paper shows awareness of importance of main ideas.
ORGANIZATION	___	___	5. Structure or pattern of the paper is clear.
	___	___	6. Paper has an introduction, development and conclusion.
	___	___	7. Each paragraph is coherent.
MECHANICS	___	___	8. Transitions from one idea to next are logical.
	___	___	9. Sentence structure is coherent.
	___	___	10. Sentences are not awkward.
	___	___	11. Sentences are varied.
	___	___	12. Errors in use of verbs are few.
	___	___	13. Errors in use of pronouns are few.
	___	___	14. Errors in use of modifiers are few.
	___	___	15. Errors in word usage are few.
	___	___	16. Punctuation errors are few.
	___	___	17. Spelling errors are few.
EVIDENCE	___	___	18. Statements are accurate.
	___	___	19. Opinions are adequately supported.
	___	___	20. Sources are identified and documented appropriately.
MECHANICS (alternative)	___	___	Paper shows control of grammar.
	___	___	Paper shows control of syntax.
	___	___	Paper has few misspellings.

A more complex rubric from Johnson and Johnson (1996) for grading a persuasive argument composition is presented below:

Persuasive Argument Composition Rubric

Name: _____ Date: _____

Title of Composition: _____

Scoring Scale: Low 1–2–3–4–5 High

Criteria	Score	Weight	Total
Organization: Thesis statement and introduction Rationale presented to support thesis Conclusion logically drawn from rationale Effective transitions		6	(30)
Content: Topic addressed Reasoning clear with valid logic Evidence presented to support key points Creativity evident		8	(40)
Usage: Topic sentence beginning every paragraph Correct subject-verb agreement Correct verb tense Complete sentences (No run-ons, fragments) Mix of simple and complex sentences		4	(20)
Mechanics: Correct use of punctuation Correct use of capitalization Few or no misspellings		2	(10)
Scale: 93-100=A, 87-92=B, 77-84=C			(100)

Making Assessments Meaningful

1. **To be meaningful, assessment has to have a purpose that is significant**, such as, (a) giving students and other stakeholders accurate and detailed feedback on the process students are using to learn and the quality and quantity of their learning and (b) improving learning and instruction.
2. **Assessments are meaningful when students are involved in conducting the assessment.**

In meaningful assessments students (a) understand the assessment procedures, (b) invest their own time and energy in making the assessment process work, (c) take ownership of assessing the quality and quantity of their work, and (d) want to share their work and talk about it with others.

3. Meaningful assessments provide a direction and road map for future efforts to learn.

Meaning is created through involvement which leads to commitment and ownership. There are five steps in making assessment meaningful.

You must ensure students are involved in

1. Setting learning goals.
2. Planning how to achieve their learning goals
3. The assessment process to determine progress and success in achieving their goals.

The assessment results are used for students to

4. Take pride and satisfaction from their efforts to learn.
5. Set new learning goals and repeat the first four steps.

Assigning Students' Grades

Most faculty who make extensive use of cooperative learning use a combination of group and individual assessment. I have done show-of-hands surveys of hundreds of faculty during cooperative learning workshops and the percentage of individual student's grade based on the evaluation of group work typically ranges from 5 to 20 percent. Some faculty use higher percentages in project-based courses, such as senior design projects in engineering. For example, below is the grade breakdown from a recent senior-level class I teach (CE/GeoE 5700, Civil Engineering Systems):

Grading

Grades will be based on the following:	<u>Maximum</u>
<u>Group</u>	
Group Projects (4 at 100 points each)	400 points
Final Examination	100 points
<u>Individual</u>	
Homework (10 points each)	50 points
Midquarter Examination 1	100 points
Midquarter Examination 2	100 points
Brief Reviews (2 at 25 points each)	50 points
Heuristics Project	75 points
Review or Application Project/Paper	125 points

Course Grades:

- A** 900 points and above
- B** Between 800 and 899 Points
- C** Between 700 and 799 Points

A grade of **D** or **F** is available upon request. Although students will be given grades of **I** if necessary, it is highly discouraged. Absolutely no incompletes will be given for uncompleted group work.

Conclusions

Assessment, especially grading, is fraught with problems and the grading of cooperative projects is no exception, indeed it adds more complexity. These problems are not new, but have been debated throughout history. The problems inherent in giving students grades has led some to study grading and marking (Becker, Geer and Hughes, 1995), others to advocate abandoning grades (Sager, 1995) and has led many others to advocate for focusing on learning and not on grading (Deutsch, 1985, Smith, 1986). Cooperative learning is an extraordinarily effective way to help students' learn (Johnson, Johnson & Smith, 1991) even in science, math, engineering and technology (Springer, Stanne & Donovan, 1997). Grading cooperative projects, although challenging and difficult can if done carefully help students and faculty reap the benefits of cooperative learning.

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