ESSENTIALS OF LEARNER-
CENTERED TEACHING

COOPERATIVE LEARNING

Rowan University | Dr. Stephanie Farrell

What is Cooperative Learning?

◻ Students work on teams to accomplish a common goal while having

- **Positive interdependence** – members rely on one another; all players are essential
- **Individual accountability** – All students are accountable for doing their share
- **Face-to-face interaction** – Some work may be parceled out, but some must be done interactively (feedback, challenging reasoning/conclusions, teaching and encouraging each other)
- **Use of collaborative skills** – develop and practice trust-building, leadership, decision making, communication, conflict management
- **Group processing** – set goals, assess work as a team, identify changes to work more effectively together in the future

What is Cooperative Learning?

Positive Interdependence
Individual Accountability
Group Processing
Social Skills
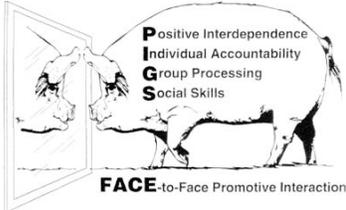
FACE-to-Face Promotive Interaction

Pedagogy21.pbworks.com

Benefits of Cooperative Learning

- □ Worksheet Activity #1
- □ What do you think are some of the benefits of cooperative learning?
- □ THINK – of 3 benefits
- □ PAIR – with 1-2 partners
- □ SHARE – your ideas with your partners

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Cooperative Learning Outcomes

- □ Academic Gain
- □ Leadership Skill
- □ Effective communication
- □ Lifelong learning
- □ Group Synergy

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Cooperative Learning Benefits

- □ Enhanced learning outcomes
  - ❑ Better individual performance: knowledge acquisition, retention, accuracy, creativity in problem solving, higher level reasoning
  - ❑ Better metacognitive thought, persistence in working toward a goal, knowledge transfer, time on task, intrinsic motivation

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Cooperative Learning Benefits

- □ Enhanced cognitive outcomes
  - ◘ Communication skills
  - ◘ Teamwork skills
  - ◘ Appreciation for diversity
  - ◘ Social Skills

Cooperative Learning Benefits

- □ Better affective outcomes
  - ◘ Higher self-esteem
  - ◘ More positive thoughts about educational experience and the college
  - ◘ More positive perception of subject area

Cooperative Learning Structures

- □ Can be used in any type of class for any type of assignment
  - ◘ Lectures
  - ◘ Laboratories
  - ◘ Project-based courses

Structures: Problem Sets

- Students do most of their HW in teams
  - Only names of contributors are included on assignment
  - Students get comfortable with this pretty fast
- Team grade for each assignment
  - Eventually individual contributions are assessed
  - Individual scores are adjusted
- Mixture of individual and group work in a class
  - One more check for individual accountability
- Teach team members how to function effectively
  - So that everyone contributes and everyone learns

Structures: Laboratories and Projects

- Team work, team grade
- Adjust team grades for individual performance
- Include some individual testing for every aspect of the project
  - "hitchhikers" who contributed nothing will be penalized and encouraged to play a more active role

Structures: Jigsaw

- Useful when assignment calls for expertise in different areas, e.g., a lab experiment
  - Experimental design
  - Equipment calibration/operation
  - Data analysis
  - Interpretation of results
- "Experts" are chosen by instructor or team
- Whole team depends on their contribution
- All students are tested on all areas
  - Experts are individually accountable
  - Experts must teach all team members (positive interdependence)

Structures: Peer Editing

- Pairs of groups do the critiquing for each other's first draft of a paper or presentation
- A grading checklist or rubric should be provided well in advance; used for peer editing
    - Helps students understand expectations
- Higher quality end product
    - Time saver for instructor

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Implementing Cooperative Learning

- Use a gradual approach to adopting strategies
    - Forming teams
    - Promoting positive interdependence
    - Providing individual accountability
    - Teach teamwork skills
- Minimize the obstacles
    - Individual student resistance
    - Dysfunctional teams

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Implementing: Forming teams

- Activity #2
- With your group, make a list of the things to consider when forming teams in a class
- Be ready to share 1 idea
- 2 min

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Implementing: Forming Teams

- Instructor should choose teams
  - Avoid problems of isolation, exclusion, etc.
  - Preparation for the industry or business environment
- 3-4 members per team
  - optimum size for diversity of ideas and individual contribution of every team member
- Heterogeneous ability
  - Minimizes "divide and conquer" approach
  - Weaker students learn from stronger students
  - Stronger students gain deeper understanding by teaching

Implementing: Forming Teams

- Make sure teams have common blocks of time to meet
- Do not isolate students if they are from a demographic at risk of dropping out
  - Highest risk in first two years
  - At risk for being marginalized, adopting passive roles
  - Criterion may be dropped closer to graduation

Implementing: How to Form Teams

- Team formation using recommended criteria can be time consuming
- CATME Team Maker®
  - On-line instrument
  - Instructor specifies sorting criteria
  - Team maker forms teams automatically and reliably

Implementing:
Promoting Positive Interdependence

- □ Assign roles to team members, rotate periodically
  - ◘ Coordinator
  - ◘ Recorder
  - ◘ Checker
  - ◘ Group process monitor
- □ Use Jigsaw to set up specialized expertise

Implementing:
Promoting Positive Interdependence

- □ Give a bonus on tests (2-3 pts) to all teams with <u>average</u> test above (e.g.,) 80%
  - ◘ Encourages strong students to tutor teammates
  - ◘ Using average takes pressure off weak students
  - ◘ Provides incentive to all students
- □ For oral reports
  - ◘ Shortly before the presentation, instructor designates which member is responsible for each section
    - ■ All students must be prepared to present on each section
    - ■ Requires positive interdependence
    - ■ Provides individual accountability

Implementing:
Promoting Individual Accountability

- □ Give individual tests that cover all material, even in project-based courses
  - ◘ Reduces the risk of "hitchhikers" doing little work and receiving same grade
- □ In lecture courses, include group homework grades in final grade determination
  - ◘ Only if s/he has a passing average on the exams
  - ◘ Include policy in syllabus
  - ◘ Very important if course serves as a prerequisite

Implementing:
Promoting Individual Accountability

- □ The <u>Process Monitor</u> is responsible for ensuring that everyone understands everything that is handed in
  - ◘ And that everyone participates in the team deliberations, all ideas and questions are heard
- □ Make teams responsible for seeing that non-contributors don't get credit
  - ◘ Class policy (syllabus) – only names of contributors go on an assignment
  - ◘ Academic integrity

Implementing:
Promoting Individual Accountability

- □ Use peer ratings to make adjustments to team grades
  - ◘ "Raw score" is adjusted by a contribution factor (0-1.05)
  - ◘ Use <u>CATME</u> peer rating system
    - ▪ Detailed survey provides adjustment factor automatically
    - ▪ Provides detailed (anonymous) feedback to students
    - ▪ Alerts instructor to problematic situations (e.g., conflict)

Implementing:
Promoting Individual Accountability

- □ Last resort options of firing and quitting
  - ◘ When a member is uncooperative
  - ◘ When everything else has been tried and failed
  - ◘ Notify in writing
    - ▪ Memo 1: ultimatum – must see change in one week
    - ▪ Memo 2: team member is fired or quits
  - ◘ Lone team member must find another team to accept them, or they will get zeroes on remaining assignments

Adopting Strategies:
Teaching Teamwork Skills

□ Team charter (video 0:41)
   ◘ Establish policies and expectations
   ◘ Handout: Team Charter Homework Assignment
□ Keep teams intact for a month
   ◘ Need time to encounter and work through problems
   ◘ Important part of teamwork skill development

Internet video

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Implementing:
Teaching Teamwork Skills

□ Provide for periodic self-assessment of team functioning
   ◘ Every 2-4 weeks
   ◘ Or (additionally) after an assignment
   ◘ In writing
      ■ How well are we meeting goals and expectations (team charter)?
      ■ Are we doing well?
      ■ What needs improvement?
      ■ What will we change?
   ◘ Or online using CATME
   ◘ Handouts: $+/\Delta$ form, Peer Evaluation Form, Reflective Grading Form

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Implementing:
Teaching Teamwork Skills

□ Worksheet Activity #3
□ In-class Groups of 3
□ Select a recorder (who has the most siblings)
□ What are some possible sources of conflict among team members?
□ 2 minutes – Go!

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Implementing:
Teaching Teamwork Skills

Implementing:
Teaching Teamwork Skills

- Give students tools for managing conflict
  - Deal with conflict quickly and rationally, don't try to ignore
  - Use active listening
    - One side makes case with no interruptions
    - Other side repeats it to the first group's satisfaction
    - Students work out a solution, usually happens quickly
    - Instructor should facilitate sessions for groups in conflict, making sure ground rules are followed

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Implementing:
Teaching Teamwork Skills

- Use "crisis clinics" to deal with difficult team members
  - When complaints of hitchhikers and dominators emerge, use this for a 10-min in-class discussion
  - Students brainstorm and prioritize possible group responses to offending behaviors
  - Brainstorming – anything goes!
  - Prioritize – be realistic
  - Students will gain excellent strategies for dealing with problems
  - Problem students will be warned that team members will be ready to deal with them

Implementing: Suggestions

- □ Start small and build up
  - ◘ Develop your comfort level gradually
- □ Explain cooperative learning at the beginning of the course
  - ◘ Students are more receptive if they know it will enhance their learning, introduce professional environment, teach important skills like teamwork and communication
  - ◘ Make team assignments more challenging than individual
    - ■ Require higher level thinking
    - ■ Students resent having to spend time on teamwork if they could do the assignment by themselves

Implementing: Suggestions

- □ Don't curve grades
  - ◘ Cooperative learning is not competitive
  - ◘ If every student has the potential to earn an A, this provides incentive for cooperation
- □ Conduct a midterm assessment
  - ◘ Find out how students feel about teamwork
  - ◘ Anonymous report — what is or is not working on their team
  - ◘ If many teams are having problems, spend some time teaching teamwork

Perceived Problems and Solutions

- □ Worksheet Activity #4
- □ Group Activity: Think-Pair-Share
- □ What problems do you anticipate with cooperative learning?
- □ Think-Pair-Share — 2 min, 2 min, 2 min Go!

Perceived Problems and Solutions

1. I will never cover the course content if we do all this group work in class!
   - Group activities can be 30s – 3 min. A total of 5 min per 50 min lecture is effective.
   - "Covering" the course content does not mean that students have <u>learned</u> it!

Perceived Problems and Solutions

2. If I don't lecture, I will lose control of the class
   - Students will be involved in discussions and problem solving.
   - You will have to spend a few seconds bringing their attention back to you.
   - This does not mean you have lost control!

Perceived Problems and Solutions

3. Group homework allows students to "hitchhike" and get credit for work they did not do
   - Use individual accountability checks
   - Each student submits a draft of individual work
   - Call on students to present solutions, whole group gets grade for student's response. Encourages stronger students to make sure all team members understand
   - Use peer evaluations on single assignments and a few times throughout the term

Perceived Problems and Solutions

4. Students will resist
   - ❑ Anticipate this and be proactive. Increase buy-in by explaining the benefits of cooperative learning
     - ■ Have you ever thought you understood a lecture, but then had trouble doing the homework? By working on problems in class, you start to understand the HW while the lecture is going on.
     - ■ Ask any professor, "when did you really learn thermodynamics" and the answer is "when I taught it". Explaining something different ways until your partner gets it, and thinking of examples and analogies will help _you_ understand a concept more deeply.
     - ■ Research shows that cooperative learning enhances learning and increases grades!

Integrating Cooperative Learning

- □ Worksheet Activity #3
- □ Design cooperative learning strategies for major activities in your class (e.g., HW, Labs, Project)
- □ Choose a structure (problem sets, labs and projects, jigsaw, peer editing)
- □ Describe implementation
- □ How will you promote positive interdependence?
- □ How will you promote individual accountability?

Key References

- □ Felder, R.M., Cooperative Learning in Technical Courses: Procedures, Pitfalls, and Payoffs, ERIC Document Reproduction Service Report ED 377038 (1994).
- □ Felder, R.M., "Hang in There! Dealing with Student Resistance to Learner-Centered Teaching", CEE, 45 (2), Spring 2011, 131-132.
- □ Felder, R.M. and Brent, R., Navigating the Bumpy Road to Student-centered Instruction, College Teaching, 44 (2), 43-47 (1996).

In many situations where teams are used to accomplish work, people want to use peer evaluations and self-evaluations to assess how effectively each team member contributes to the team. The Comprehensive Assessment of Team Member Effectiveness (CATME) was developed for this purpose based on extensive university research. A web-based survey at www.catme.org makes it possible to collect data on team-member effectiveness in five areas that research has shown to be important. Faculty can configure the site to survey any or all of the areas.

1. Contributing to the team's work
2. Interacting with teammates
3. Keeping the team on track
4. Expecting quality
5. Having relevant knowledge skills and abilities

The primary CATME instrument is a behaviorally anchored rating scale, which describes behaviors that are typical of various levels of performance in each of the five categories. Raters select the category of behaviors that most closely matches the actual behavior of each student on their team (including themselves). A sample instrument on the CATME website shows the behavioral descriptions for all five categories and allows faculty and students to practice using the system by rating four fictitious team members.

Special Feature—helping professors understand what is happening in student teams
One of the most valuable features of the system is that it alerts faculty regarding exceptional conditions that provide information about teams and team-members.
- **Low**—a student who rates him/herself as ineffective and who also receives "ineffective" ratings by teammates.
- **Overconfident**—a student rated as "ineffective" by teammates but rates him/herself as much more effective.
- **High**—a student who is rated as highly effective according to both teammate and self ratings.
- **Underconfident**—a student rated as highly effective by teammates but who under-rates her/himself.
- **Manipulator**—a student who rates him/herself as highly effective and who rates teammates as ineffective in disagreement with teammates. Such a student may be trying to influence the distribution of grades unfairly.
- **Conflict**—a team in which there is considerable disagreement among the various raters about the effectiveness of an individual student.
- **Clique**—a team in which cliques appear to have formed. The ratings show that subsets of the team rate members of their subset high and members of other subsets low.

Most importantly, some of these conditions have more than one explanation. A student flagged as a "manipulator" might actually have performed a disproportionately large amount of the work on the project even though they worked to engage their teammates in the process. Thus, an instructor's involvement and judgment are critical when exceptional conditions are flagged. Though the formal study of these exceptions has not been completed, faculty using the system have reported that both the clique and conflict conditions have accurately provided early warnings of those conditions. Information on the design of the instrument and research supporting its use (including validity studies) can also be found at www.catme.org.

The Online Interface

The CATME website is a secure interface for collecting data on team-member effectiveness and reporting different views of the data to faculty and students. The CATME system has a number of convenient features—the ability to upload student and team data from files generated by Excel; support for multi-section courses and teaching assistants; the ability to edit teams, reset surveys, send email reminders, and track survey completion. The system also allows students to make comments for instructors to read and can compute grade adjustments based on how the ratings patterns compare with faculty-specified criteria.

Faculty can request an account at www.catme.org. The process of defining a class and setting up teams is wizard-based, but a tutorial is available. Several typical screen shots are captured here:
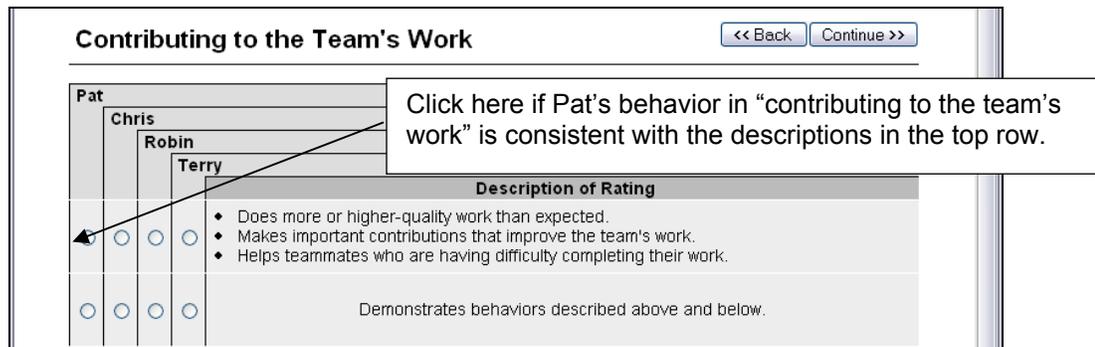
The first of five rating categories: Contributing to the Team's Work.
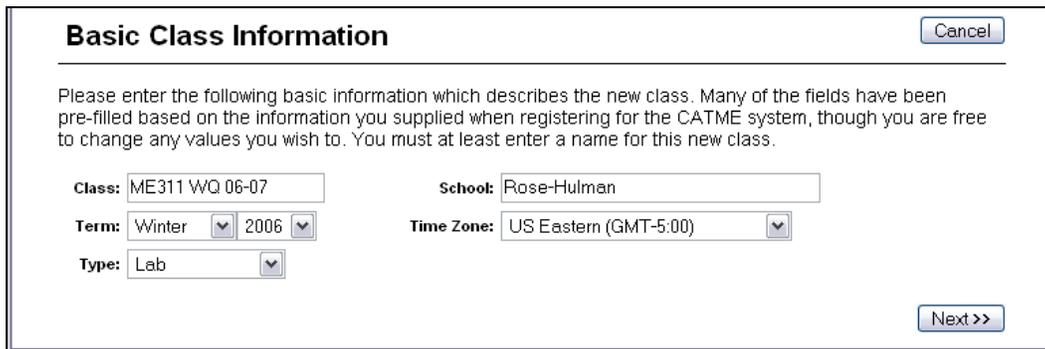
The wizard-based interface for class creation in CATME is typical of other setup screens.

Faculty summary results (raw data available).   *Student results: by self, by team, average*

Team composition affects the success of individuals and teams in cooperative learning and project-based team environments. Using appropriate criteria when assigning students to teams should result in improved learning experiences. In spite of the benefits, assigning teams can be a lot of work for instructors, especially in larger classes and when more than a few simple criteria are used. Team-Maker was created to make the team assignment process simpler, even when using a complicated set of criteria. A web-based survey at www.catme.org collects data from students that is used to form teams according to instructor-specified criteria.

Only Survey the Criteria that are Important to You

The Team-Maker offers a variety of criteria to choose from to use in forming teams. Some criteria have been found by research to be important to student learning, as noted below. Others are suspected to be important, particularly in some situations, but no research has been identified that conclusively supports how those criteria should be used.

- *Schedule:* students mark unavailable times in a weekly schedule grid and the system tries to match students with compatible schedules. No research is available on the effect of schedule compatibility, because it has never been possible to form teams on the basis of schedule to the extent that Team-Maker offers. No more complaints that they can't meet!
- *Gender:* women should not be outnumbered on a team.
- *Race / ethnicity:* minorities should not be outnumbered on a team.
- *Grade-Point Average:* students learn better in teams of heterogeneous ability.
- *Pre-Requisite course grade:* students learn better in teams of heterogeneous ability.
- *Software skills:* self-assessed skill with software entered by the faculty member.
- *Discipline:* useful for assigning teams that have students from a variety of disciplines
- *Sub-discipline:* available for Civil Engineering and Business to date. Others to be added.
- *Writing skills:* self-assessed. Can be used to distribute certain skills among teams.
- *Hands-on skills:* self-assessed. Can be used to distribute certain skills among teams.
- *Shop skills:* self-assessed. Can be used to distribute certain skills among teams.
- *Leadership preferences:* self-assessed. Can be used to distribute preferences.
- *Big-picture / detail-oriented:* self-assessed. Can be used to distribute preferences. This measure has not been validated.
- *Commitment level:* self-assessed, estimated as the number of hours per week a student is willing to give the course. Research shows that teams of students with incompatible goals experience conflict. This assessment has not yet been shown to be a valid measure.
- *Fraternity / Sorority:* Some have proposed that teams in which some students also have a social affiliation can improve social cohesion. At the same time, others have expressed concern that cliques may form within teams formed this way. Research is needed.
- *Sports:* Similar to the fraternity / sorority question, there are reasons to group students together based on this criterion and other reasons why it may be better to separate them.

Choose How the Criteria are Used to Form Teams

Using too many criteria weakens the contribution of the others. Fortunately, Team-Maker can survey many criteria, but faculty can later choose different weights for each criterion—including ignoring some criteria. In general, you can group similar students or dissimilar students. The default is "ignore," except where research is clear that a particular method is preferred. As shown below, Team-Maker does not allow intentionally forming teams with incompatible schedules.

Maximum ▾ **team size** 4   View Student Comments

Schedule

Ignore ———— Group Similar

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
8:00am	56%	62%	49%	64%	71%	33%	35%
9:00am	56%	65%	52%	70%	75%	33%	34%
10:00am	62%	68%	58%	75%	70%	30%	31%
11:00am	74%	74%	72%	80%	76%	26%	28%
12:00pm	70%	77%	71%	78%	70%	24%	26%
1:00pm	56%	73%	59%	76%	66%	18%	19%
2:00pm	57%	62%	51%	71%	66%	17%	17%
3:00pm	52%	56%	42%	65%	70%	16%	16%
4:00pm	45%	61%	37%	64%	68%	17%	15%
5:00pm	34%	52%	30%	55%	52%	18%	14%
6:00pm	22%	30%	20%	33%	29%	17%	14%
7:00pm	15%	13%	14%	13%	18%	17%	14%
8:00pm	12%	10%	13%	10%	16%	18%	15%
9:00pm	10%	10%	11%	9%	16%	17%	15%

(showing percentage of students busy, by hour)

GPA

Group Dissimilar ———— Ignore ———— Group Similar

Above 3.66 (48)	14%
2.67 - 3.66 (135)	41%
1.67 - 2.66 (72)	22%
0.67 - 1.66 (22)	6%
Below 0.67 (20)	6%
No resp (27)	8%

See How Well the Teams Meet Your Criteria

After criteria and weights are selected, the Team-Maker algorithm scores how well each team fits the instructor's criteria and maximizes the score of the worst-fit team. Research has shown this algorithm to outperform an experienced faculty member using the same criteria. Team-Maker shows a final screen illustrating how well the teams meet your criteria. If needed, you can change your team-formation criteria in just a few clicks and run Team-Maker again.

Name	Student ID	Email	Team Name	Schedule	Sex	Race	Sports	Grade	Total:
☐ conf, itsa	itsaconf	itsaconf@deer-run.com		78% busy	Male	White/Caucasian	Golf	2.95 (2)	
☐ low, shesa	shesalow	shesalow@deer-run.com	1	68% busy	Male	White/Caucasian	Football,Hockey	3.39 (3)	
☐ manip, hesa	hesamanip	hesamanip@deer-run.com		59% busy	Male	White/Caucasian	Football,Golf	1.32 (1)	
☐ over, itsa	itsaover	itsaover@deer-run.com		83% busy	Female	White/Caucasian	Football	3.65 (4)	
			Scores:	-2.62	-5.00	5.00	1.88	5.00	4.26
☐ cliq, hesa	hesacliq	hesacliq@deer-run.com		81% busy	Male	Indian	Basketball,Golf,Hockey	3.53 (3)	
☐ conf, shesa	shesaconf	shesaconf@deer-run.com	2	83% busy	Male	White/Caucasian	Football,Golf,Soccer	3.99 (4)	
☐ high, hesa	hesahigh	hesahigh@deer-run.com		57% busy	Male	White/Caucasian	Soccer,Hockey	2.16 (1)	
☐ low, itsa	itsalow	itsalow@deer-run.com		23% busy	Male	White/Caucasian		3.02 (2)	
			Scores:	-1.67	5.00	-5.00	1.50	5.00	4.83

Cooperative Learning Overview
Rowan University

What is cooperative Learning?

Students work in fixed teams on structured learning tasks under conditions that involve:

1. Positive interdependence. Team members must rely on one another to accomplish goal.
2. Individual accountability. Members held accountable for (1) doing their share and (2) mastering all material.
3. Interaction. Some or all work done by members working together.
4. Appropriate use of interpersonal skills. Leadership, decision-making, communication, & conflict management.
5. Regular assessment of team functioning.

Cooperative Learning is not
- students sitting around a table studying together
- team projects with just 1 or 2 students doing the work
- splitting up homework problems so that each student solves one problem only

Benefits of Cooperative Learning
- information retention
- academic achievement
- higher-level thinking skills
- attitudes toward subject, motivation to learn it
- teamwork, interpersonal skills
- understanding of professional environment
- communication skills
- self-esteem
- lower level of anxiety (due to lower emphasis on competition)
- race, gender relations
- class attendance

Why cooperative learning works:
- *Active* learning
- Individual students get stuck, give up. Teams keep going.
- Students see and learn alternative problem-solving strategies.
- More and better question generation, less fear in class.
- Students, like professors, learn best what they teach.

Requirements of Cooperative Learning:
1. Assign different roles to team members (leader, checker, recorder,...). Rotate them from one assignment to the next.
2. Each team member should begin solutions to all problems individually, and then complete solutions together as a team.
3. Each assignment must have the names of those who participated in the solution of the problems and understands *all the solutions.*.

Homework Grade will be based on the following:

Team scores on homework.

Team bonus points will be given, if all team members score higher than a stated objective.

At random intervals a team representative, chosen by the professor, will be called to give a solution to a homework problem.

Each team member must submit a draft copy of his/her individual work to receive credit for the assignment.

Forms for Cooperative Learning

Following are forms that may be modified and used when students are working on assignments in teams in a course.

1. **Preliminary questionnaire (p. 2)**

   Administer and collect on Day 1 of the course. Form teams based on ability heterogeneity, common blocks of time to meet outside class, not allowing members of at-risk minority populations to be isolated in a group early in the curriculum when they are most likely to drop out, and (optional) common interests.

2. **Team policies and expectations (p. 3)**

   Hand this (or your own version) out on Day 1 and go over it in class.

3. **Team expectations assignment (p. 4)**

   Have teams fill out this form, sign it, and hand it in during the first week. Hand it back to them after 3-4 weeks to remind them of the rules they had agreed on.

4. **Peer autorating forms (pp. 5-7)**

   Give the first form to students on Day 1. Tell them that they will be completing the form for each of their teammates and themselves at the end of the semester or when the project is complete, and the ratings will be used to make individual adjustments to their team grade. Briefly go through the form with them. When the team has worked together for at least a month, have them fill the forms out and exchange and discuss them with one another. Tell students to fill one out for each of their teammates and share them with one another. You don't see these—they're mainly to give students who haven't been pulling their weight a warning that unless they get it together their grade on the assignments will be hurt. When ratings that count are later collected, low ones will not come as a surprise to anyone who got them in this practice round and didn't change his or her behavior.

   Hand the second form out at the end of the semester and/or when the project is complete and/or at mid-semester and/or after every assignment. Students fill them out confidentially and turn them in to you. You convert the verbal ratings to numbers and use a spreadsheet to determine individual weighting factors for the team project grade or the average of the grades for the period in question, following the procedure outlined on the third form.

5. **Cooperative learning checklists (pp. 8–10)**

   Checklists are provided to help you select appropriate implementation techniques for cooperative learning in homework groups, design projects/major presentations, and laboratory courses.

6. **Resources on cooperative learning (pp. 11–12).**

   Books, articles, and Web sites for practical suggestions and the research base that supports them.

PRELIMINARY QUESTIONNAIRE[*]

Name (Last, First) _____ **Nickname** _____

Section _____   **Instructor** _____

Main interests/hobbies: _____

Gender: ____ Female   ____ Male

Ethnicity: ____ African-American   ___ Asian-American   ___ Hispanic

_____ ____ International   ___ Native American   ___ Other (specify) _____

Grades in prerequisite courses: CH 107 ____   MA 241 ____   PY 205 ____

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
8–9 a.m.							
9–10							
10–11							
11–12							
12–1 p.m.							
1–2							
2–3							
3–4							
4–5							
5–6							
6–7							
7–8							
8–9							
9–10							
10–?							

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[*] We would be grateful if you answer every question, but if for any reason you wish to skip those on gender, ethnicity, and interests you may do so.

Essentials of Learner-Centered Teaching

R.M. Felder and R. Brent, *Forms for Cooperative Learning*, <*www.ncsu.edu/felder-public/CLforms.doc*>

Team Policies and Expectations

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

- *Designate a coordinator, recorder and checker for each assignment.* 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 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.*

- **If a team member refuses to cooperate on an assignment, his/her name should not be included on the completed work**. If the non-cooperation continues, the team should meet with the instructor so that the problem can be resolved, if possible. If no resolution is achieved, 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 find a team of 3 willing to accept them as a member, otherwise they 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 agreement is the goal of the assignment on the last page of this handout.

Essentials of Learner-Centered Teaching

Team Expectations Assignment

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.

These expectations are for your use and benefit—we won't grade them or even comment on them unless you ask us to. 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.

Essentials of Learner-Centered Teaching

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 given below.

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

Name of student being evaluated: _____

<u>Circle your responses.</u>

Has the student attended your group meetings?   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

Has the student made a serious effort at assigned work
before the group meetings?   1   2   3   4   5

Does the student attempt to make contributions in group
meetings when he/she can?   1   2   3   4   5

Does the student cooperate with the group effort?   1   2   3   4   5

Overall rating on the following scale: _____ (Insert one of the given words.)

Excellent	Consistently went above and beyond—tutored teammates, carried more than his/her fair share of the load
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

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[*] Adapted from a form in *Cooperative Learning and College Teaching,* reprinted in B.J. Millis and P.G. Cottell, Jr., *Cooperative Learning for Higher Education Faculty*, Oryx Press, Phoenix, 1998. Each student fills out one form for each team member after the team has worked together for several weeks. Instructor does not see these forms.

R.M. Felder and R. Brent, *Forms for Cooperative Learning*, *<www.ncsu.edu/felder-public/CLforms.doc>*

Peer Rating of Team Members[*]

Name_____   **Group #**_____

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 homework assignments. The possible ratings are as follows:

Excellent	Consistently went above and beyond—tutored teammates, carried more than his/her fair share of the load
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**	**Reason for Rating < Satisfactory**
_____	_____	_____ _____
_____	_____	_____ _____
_____	_____	_____ _____
_____	_____	_____ _____

Your signature: _____

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[*] R.M. Felder, 2004. Each student fills out this form, instructor collects and uses to adjust team project grades for individual team members using procedure on following page.

Essentials of Learner-Centered Teaching

Autorating System[*]

1. Determine group project or average homework grade.

2. Convert individual verbal ratings to numbers:

   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. In the "Vote 1" column are the votes given by Betty to herself, Carlos, John, and Angela; under "Vote 2" are all of the votes given by Carlos, etc.

4. Average individual marks, calculate overall team average, calculate adjustment factors as individual average divided by team average. **Impose an upper limit of 1.05 on any individual student's adjustment factor.** Doing so avoids raising grades of teammates of students with very low ratings by more than half a letter grade.

5. Individual project grade = (team grade) x (adjustment factor). **The instructor reserves the right to disregard anomalous ratings.**

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

[*]This sheet is for instructor 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. For a complete reprint, contact Rob Brown at *rwb@rmit.edu.au*.

To read about research done on the effectiveness of this instrument, see

Kaufman, D. B., Felder, R. M., & Fuller, H. (2000). Accounting for individual effort in cooperative learning teams. *Journal of Engineering Education, 89* (2), 133–140.
<http://www.ncsu.edu/felder-public/Papers/Kaufmanpap.pdf>

R.M. Felder and R. Brent, *Forms for Cooperative Learning*, *<www.ncsu.edu/felder-public/CLforms.doc>*

Checklists for Cooperative Learning Implementation

CL Checklist for Homework Assignments

___   Setting policies: Include all policies and procedures for homework groups in the material you pass out on Day 1. Include any peer rating form you plan to use.

___   Group formation: Groups should be teacher-assigned and have 3-4 members with a mixture of ability levels and common blocks of time to meet outside class. Early in the curriculum, don't let members of at-risk minorities be isolated in a team. (Use the form on p. 2 to get the required information.)

___   First Assignment: As part of the first assignment, have teams write a list of expectations they have for each other (e.g. come to meetings prepared and on time, do what you're supposed to do, let the others know if you won't be able to fulfill a responsibility, etc.) and sign them. (Use the form on p. 4.)

___   Regular Assignments: Team roles (coordinator, recorder, checker, monitor) should rotate with each assignment, with no one repeating a role until everyone in the group has had a turn at each one.   In 3-person groups, combine the roles of checker and monitor. Consider requiring students to complete and turn in individual outlines of solutions to promote accountability and avoid a situation in which the same student begins every problem solution. Instruct teams to omit names of non-participants when turning in assignments.

___   Bonus: Consider offering a bonus (3-5 points) on tests to members of groups in which the team test average is above (say) 80%.

___   Team self-assessment: Every few weeks, include in assignments questions for self-assessment of group functioning. (What are we doing well as a team? What do we need to improve? What, if anything, will we do differently from now on?). Teams may also evaluate themselves on how well they are meeting the expectations they set in the first assignment.

___   Peer ratings: At the beginning of the semester, hand out and explain any peer rating form you plan to use (e.g., the one on p. 5 or p. 8), stating that you will be using their ratings to adjust the team homework grade for individual performance. At mid-semester, have students submit their ratings and use the results to adjust the average homework grades for the first half of the semester. Another option is to share the results with students so that they can make changes in their team performance, but don't use them to adjust grades. Repeat at the end of the semester to adjust the second-half homework grades.

___   Firing and quitting: Provide last resort options of firing and quitting. Be sure to describe the required procedures in the material you hand out on the first day. (See form on p. 3.)

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CL Checklist for Design Projects/Major Presentations

___   Setting policies. Include all policies and procedures for project teams (p. 3) in the material you pass out on Day 1. Include any peer rating form you plan to use (p. 5 or p. 8).

___   Group formation: Groups should be teacher-assigned and have 3-4 members with a mixture of ability levels and common blocks of time to meet outside class. Early in the curriculum, don't let members of at-risk minorities be isolated in a team. (Use the form on p. 2 to get the required information.)

___   First Assignment: Shortly after they are formed, have teams write a list of expectations they have for each other (e.g. come to meetings prepared and on time, do what you're supposed to do, let the others know if you won't be able to fulfill a responsibility, etc.) and sign them. (Use the form on p. 4.)

___   Jigsaw: Use Jigsaw to provide specialized expertise within each group. Designate each team member as the "expert" in one aspect of the project and provide specialized training to all the experts in each aspect.

___   Set milestones: Consider breaking the project into intermediate steps with parts turned in throughout the semester (preliminary plans and cost analysis, list of related literature, rough draft of final report, etc.). This practice helps teams distribute the work and reveals problems with individual members before the end of the semester when it may be too late to address them.

___   Team self-assessment: Every few weeks, include in assignments questions for self-assessment of group functioning. (What are we doing well as a team? What do we need to improve? What, if anything, will we do differently from now on?). Teams may also evaluate themselves on how well they are meeting the expectations they set in the first assignment.

___   Peer ratings: At the beginning of the semester, hand out and explain any peer rating form you plan to use (e.g., the one on p. 5 or p. 8), stating that you will be using their ratings to adjust the team project grade for individual performance. At mid-semester, have students submit their ratings and use the results to adjust the average project grades for the first half of the semester. Another option is to share the results with students so that they can make changes in their team performance, but don't use them to adjust grades. Repeat at the end of the semester to adjust the second-half project grades.

___   Random presenter selection: Have the presentation of the project divided into definable sections. The day before (or an hour before or five minutes before) the presentation, randomly assign a group member to present each part. Be sure to tell students early in the semester you will be doing this. Base the team's presentation grade on how well each part is presented.

___   Individual accountability: If the project is a major component of the course, give some individual assignments and an individual examination covering the entire project content. Count the results toward the course grade.

___   Firing and quitting: Provide last resort options of firing and quitting. Be sure to describe the procedures in the material you hand out on the first day. (See form on p. 3.)

Essentials of Learner-Centered Teaching

CL Checklist for Laboratory Courses

___   Setting policies. Include all policies and procedures for project teams (p. 3) in the material you pass out on Day 1. Include any peer rating form you plan to use (p. 5 or p. 8).

___   Group formation: Groups should be teacher-assigned and have 3-4 members with a mixture of ability levels and common blocks of time to meet outside class. Early in the curriculum, don't let members of at-risk minorities be isolated in a team. (Use the form on p. 2 to get the required information.)

___   First Assignment: Shortly after they are formed, have teams write a list of expectations they have for each other (e.g. come to meetings prepared and on time, do what you're supposed to do, let the others know if you won't be able to fulfill a responsibility, etc.) and sign them. (Use the form on p. 4.)

___   Team roles: Define appropriate functional roles (coordinator, recorder, monitor, checker) and technical roles (data analyst, graphic artist, experimental designer, statistician, theoretical analyst…). Rotate the functional roles with each experiment.

___   Jigsaw: Use Jigsaw to provide specialized expertise within each group. Designate each team member as the "expert" in one aspect of the lab (e.g., experimental design, equipment calibration and operation, data analysis, theoretical interpretation,...) and provide specialized training to all the experts in each aspect.

___   Peer review: Have teams swap lab report drafts to provide peer reviewing and feedback. This step will improve the quality of the product you have to evaluate. Collect and mark the critiques to improve their quality in subsequent labs.

___   Team self-assessment: Every few weeks, include in assignments questions for self-assessment of group functioning. (What are we doing well as a team? What do we need to improve? What, if anything, will we do differently from now on?). Teams may also evaluate themselves on how well they are meeting the expectations they set in the first assignment.

___   Peer ratings: At the beginning of the semester, hand out and explain any peer rating form you plan to use (e.g., the one on p. 5 or p. 8), stating that you will be using their ratings to adjust the team lab grade for individual performance. At mid-semester, have students submit their ratings and use the results to adjust the average lab grades for the first half of the semester. Another option is to share the results with students so that they can make changes in their team performance, but don't use them to adjust grades. Repeat at the end of the semester to adjust the second-half lab grades.

___   Individual accountability: During the lab, circulate and ask individual students to report on what the team is doing. Give individual tests on the material covered in the lab report (experimental design, equipment calibration and operation, data analysis and interpretation,...)

___   Firing and quitting: Provide last resort options of firing and quitting. Be sure to describe the procedures in the material you hand out on the first day. (See form on p. 3.)

R.M. Felder and R. Brent, *Forms for Cooperative Learning*, *<www.ncsu.edu/felder-public/CLforms.doc>*

Resources on Cooperative Learning

To get an overview of CL:

1. Felder, R. M., & Brent, R. (1994). *Cooperative learning in technical courses: Procedures, pitfalls, and payoffs.* Report to the National Science Foundation. (ERIC Document Reproduction Service No. ED 377 038). *http://www.ncsu.edu/felder-public/Papers/Coopreport.html*

2. Millis, B. J. & Cottell, Jr., P. G. (1998). *Cooperative learning for higher education faculty.* Phoenix, AZ: Oryx Press.

To find practical suggestions for CL structures and troubleshooting:

3. Felder, R. M., & Brent, R. (1996). Navigating the bumpy road to student-centered instruction. *College Teaching, 44*(2)*,* 43–47. *http://www.ncsu.edu/felder-public/Papers/Resist.html*.

4. Felder, R. M., & Brent, R. (2001). FAQs-3. Groupwork in distance learning. *Chemical Engineering Education, 35*(2), 102–103. *http://www.ncsu.edu/felder-public/Columns/FAQs-3.html*.

5. Felder, R. M., & Brent, R. (2001). Effective Strategies for Cooperative Learning. Journal of Cooperation and Collaboration in College Teaching*, 10*(2), 69–75. *http://www.ncsu.edu/felder-public/Papers/CLStrategies(JCCCT).pdf*.

6. Felder, R.M., & Brent, R. (2003). Designing and Teaching Courses to Satisfy the ABET Engineering Criteria. *J. Engr. Education, 92*(1), 7–25. Appendix E of this paper demonstrates that Cooperative Learning can be used to address all of Outcomes 3a–3k. *http://www.ncsu.edu/felder-public/Papers/ABET_Paper_(JEE).pdf*.

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

8. Kaufman, D.B., Felder, R. M., & Fuller, H. (2000). Accounting for individual effort in cooperative learning teams. *Journal of Engineering Education, 89*(2), 133–140. *http://www.ncsu.edu/felder-public/Papers/Kaufmanpap.pdf*.

9. McKeachie, W. J. (2002). Teaching tips: Strategies, research, and theory for college and university teachers (11th ed.). Boston: Houghton Mifflin. (Chapter 15)

10. Oakley, B., Felder, R.M., Brent, R., & I. Elhajj, I. (2004). "Turning Student Groups into Effective Teams," *J. Student Centered Learning, 2*(1), 9–34. *http://www.ncsu.edu/felder-public/Papers/Oakley-paper(JSCL).pdf*.

To explore the research base for CL:

11. Johnson, D. W., Johnson, R. T., & Stanne, M.E. (2000). *Cooperative Learning Methods: A meta-analysis.* University of Minnesota, Minneapolis: Cooperative Learning Center. *http://www.co-operation.org/pages/cl-methods.html*.

12. 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. *http://www.wcer.wisc.edu/nise/CL1/CL/resource/R2.htm*.

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

To read about a longitudinal study of cooperative learning in engineering education:

14. Felder, R.M., Felder, G.N., & Dietz, E.J. (1998). A Longitudinal Study of Engineering Student Performance and Retention. V. Comparisons with Traditionally-Taught Students. *J. Engr. Education, 87*(4), 469–480. *http://www.ncsu.edu/felder-public/Papers/long5.html*.

15. Felder, R.M. (1995). A Longitudinal Study of Engineering Student Performance and Retention. IV. Instructional Methods and Student Responses to Them. *J. Engr. Education, 84*(4), 361–367. *http://www.ncsu.edu/felder-public/Papers/long4.html*.

16. Felder, R.M., Felder, G.N., Mauney, M., Hamrin, Jr., C.E., & Dietz, E.J. (1995). A Longitudinal Study of Engineering Student Performance and Retention. III. Gender Differences in Student Performance and Attitudes. *J. Engr. Education, 84*(2), 151–174. *http://www.ncsu.edu/felder-public/Papers/long3.pdf*.

For on-line information on CL:

17. *Active/Cooperative Learning: Best Practices in Engineering Education.* A collection of resources compiled by the Foundation Coalition, including excerpts from videotaped interviews with some of the leading practitioners of CL in engineering education on different aspects of planning and implementation. *http://clte.asu.edu/active/main.htm*.

18. *Engineering Team Training Workbook.* This workbook of team exercises was developed at Arizona State University. *http://www.eas.asu.edu/~asufc/teaminginfo/teams.html*.

19. *IASCE.* The web site of the International Association for the Study of Cooperation in Education. A collection of resources including a newsletter, list of related organizations and links, and a search engine. *http://www.iasce.net/*.

20. *Innovations in SMET Education.* The web site of the National Institute for Science Education at the University of Wisconsin. Resources on collaborative learning (including Cooper and Robinson's outstanding annotated bibliography on cooperative learning), learning through technology, and assessment of learning. *http://www.wcer.wisc.edu/nise/CL1/*.

21. *Online Collaborative Learning in Higher Education.* An excellent resource for articles and links maintained by the Central Queensland University. *http://clp.cqu.edu.au/*.

22. *TEAMWORKS.* The Virtual Team Assistant. Modules on various aspects of team functioning including team building, project management, problem solving, conflict management, feedback, leadership, oral and written presentations, and (for instructors) teaching with teams. Compiled by Barbara O'Keefe of the University of Illinois. *http://www.vta.spcomm.uiuc.edu/*.

23. *Ted Panitz's home page.* A vast collection of resources on cooperative learning including an e-book, articles, faculty surveys, examples, and links to many other sites, compiled by Ted Panitz of Cape Cod Community College. *http://home.capecod.net/~tpanitz*.

24. *The University of Minnesota Cooperative Learning Center.* Information and references on different aspects of cooperative learning, including "Cooperative Learning Methods: A Meta-Analysis," which summarizes the results of a large number of CL research studies. The site is maintained by David and Roger Johnson of the University of Minnesota. *http://www.co-operation.org/*.

Team Charter
Homework Assignment

1. Names, majors

2. E-mail and phone numbers

3. *Possible* meeting time for class assignments, when all team members can meet

4. Bulleted list of ground rules

    a. How will your team arrange meeting times?

    b. How will you make sure all team members know about meetings?

    c. How will you make expectations & responsibilities clear?

    d. What is the expected conduct at meetings (punctuality, attendance, staying

    on topic, level of preparation, etc.)?

5. How will your team avoid the following situations:

    a. Four homework problems are assigned. Your team uses the "divide and conquer approach" – each team member is responsible for one problem. You plan to put the homework together in class on the due date. One team member did not do his problem, so the team turns in only three problems.

    b. Your team meets to finish working on a report the day before it is due. The report is complete, and one team member agrees to print it out at home and bring it to class the next morning. However, the team member oversleeps, the assignment is late, and the team's grade is docked.

    c. An assignment is due at the beginning of class on Monday, one week after it was assigned. Your team meets on Friday to divvy up the work, which requires Internet access. One team member will be at home for the weekend and does not have a computer at home. She says she cannot contribute to the assignment, and she is irritated at team members for excluding her. Her team members are annoyed that she is not pulling her weight.

    d. Your team has three members. Two of the members live in the same dorm. One Tuesday night at 10:00, they decide that it would be a convenient time to work on the homework assignment. They call the third team member but she does not answer the phone. The two team members complete the assignment and decide not to put the third team member's name on it because she did not contribute.

Plus/Delta Team Reflection

Make notes individually and then share your thoughts in a *Roundrobin* fashion.

+	**Δ**
What are we doing well as a team? Note anything about the team that was productive or enjoyable.	Is there one thing about the team that you would like to see improved? Don't just criticize; suggest an improvement.

Are there any common concerns? Select one thing that all team members would like to improve. Come to consensus on some specific strategies that all team members feel comfortable using to improve team functioning in this area:

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