

# Strategies for Engaging Students in Large Classes

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Opening the Door:  
Sharing the Craft of Teaching

***University of Minnesota***

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# Large Classes: The Current Situation

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Classes with Over 50 students – Prevalent and Increasing; ditto for Classes with Over 100 students

Classes of 50 students or more:  
Best National Universities (Top 50) – 1-28%, Avg =  
12.4, S.D. = 6.3

National Universities (Next 50) – 0.3-50%, Avg =  
12.1, S.D. = 7.7

U.S. News & World Report ([www.usnews.com](http://www.usnews.com)) (Accessed  
10/16/00)

# Large Classes: How Well are They Working?

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Carbone and Greenberg (1998) indicate a general dissatisfaction with the quality of large-class learning experiences

- Lack of interaction with faculty members (in and out of class)
- Lack of structure in lectures
- Lack of or poor discussion sections
- Inadequate contact with teaching assistants
- Inadequacy of classroom facilities and environment
- Lack of frequent testing or graded assignments

# Large Classes: How Well are They Working? Students' Comments

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Wulff, Nyquist & Abbott (1987):

- “It is easier to do anything you want, sleep, not attend, or lose attention”
- “No one knows I’m here”
- “Rude people come late, leave early, or sit and talk to their buddies”

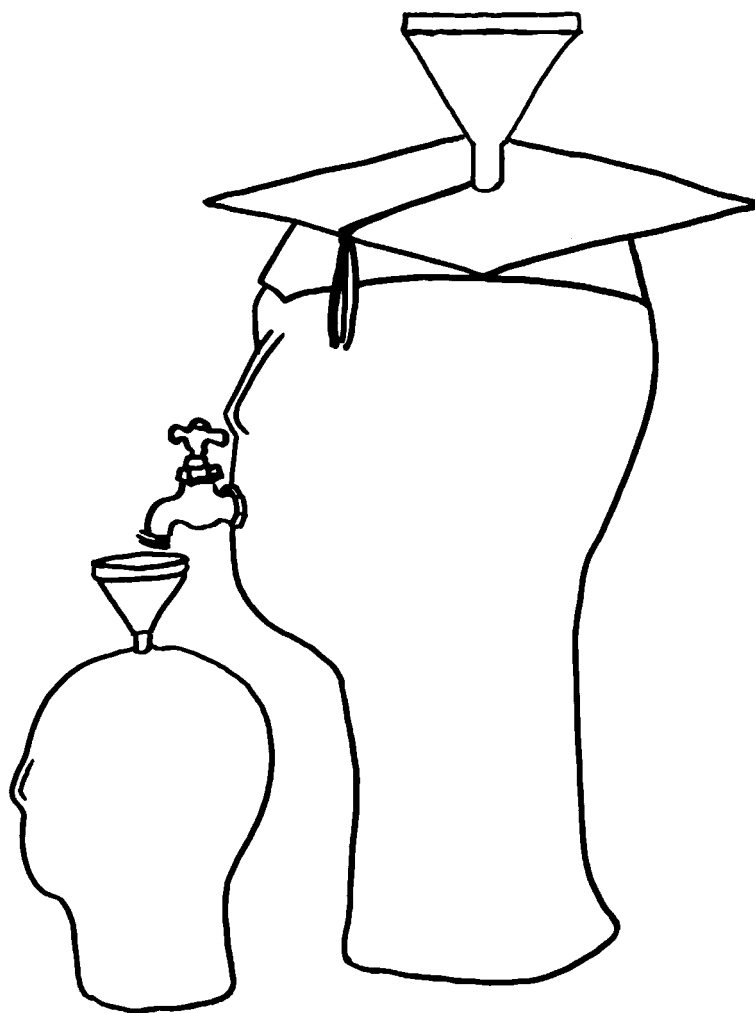
# **Wulff, Nyquist & Abbott (1987)**

## **Conclusion & Recommendation**

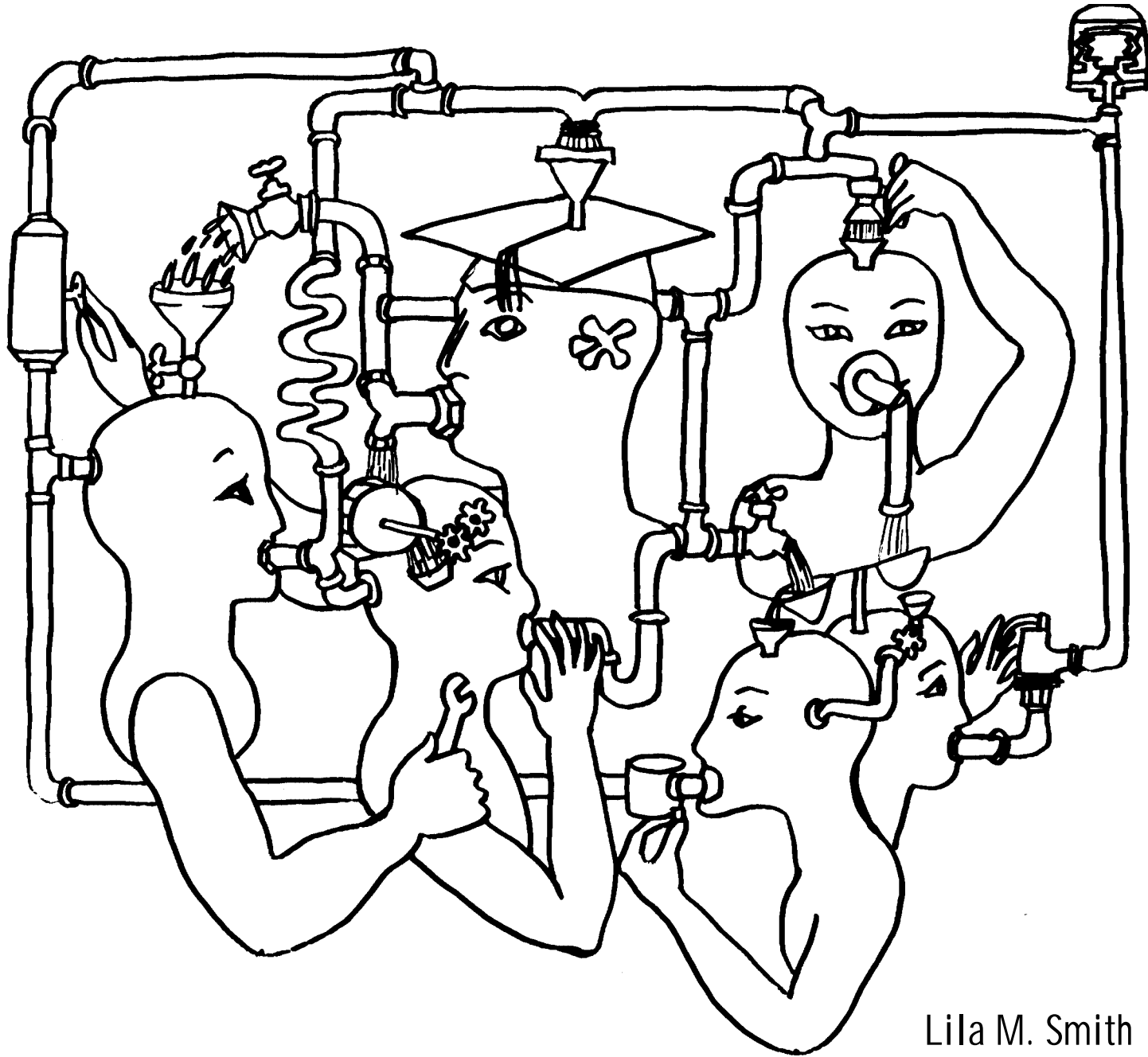
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Foremost among the dimensions of large classes that hindered students' learning was the lack of instructor-student interaction with opportunities for questions and discussion.

The key seems to lie in finding ways to provide instructor-student interaction in the large-class context.



Lila M. Smith



Lila M. Smith

*To teach is to engage students in learning; thus teaching consists of getting students involved in the active construction of knowledge. A teacher requires not only knowledge of subject matter, but knowledge of how students learn and how to transform them into active learners. Good teaching, then, requires a commitment to systematic understanding of learning. . . The aim of teaching is not only to transmit information, but also to transform students from passive recipients of other people's knowledge into active constructors of their own and others' knowledge. The teacher cannot transform without the student's active participation, of course. Teaching is fundamentally about creating the pedagogical, social, and ethical conditions under which students agree to take charge of their own learning, individually and collectively*

*Education for judgment: The artistry of discussion leadership.* Edited by C. Roland Christensen, David A. Garvin, and Ann Sweet. Cambridge, MA: Harvard Business School, 1991.

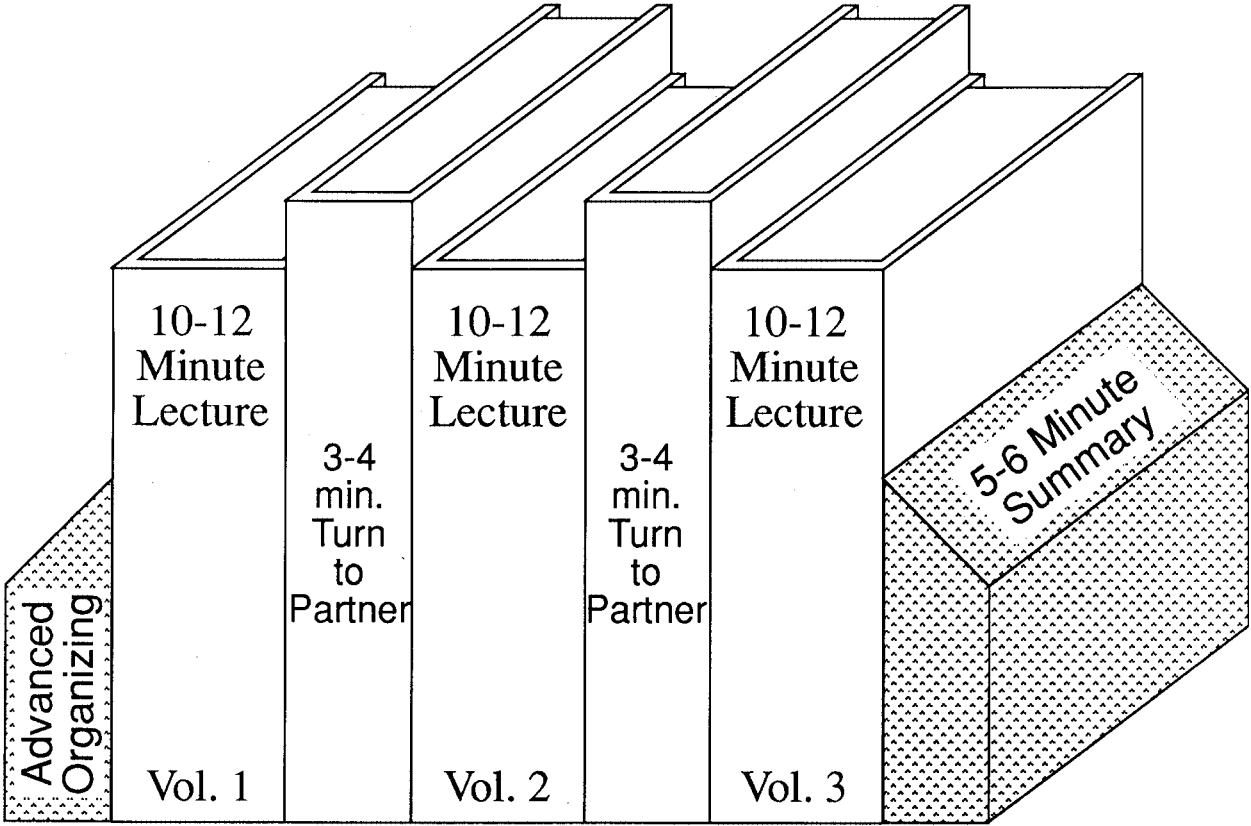


**Cooperative Learning** is instruction that involves people working in teams to accomplish a common goal, under conditions that involve both *positive interdependence* (all members must cooperate to complete the task) and *individual and group accountability* (each member is accountable for the complete final outcome).

## **Key Concepts**

- ! Positive Interdependence
- ! Individual and Group Accountability
- ! Face-to-Face Promotive Interaction
- ! Teamwork Skills
- ! Group Processing

Informal Cooperative Learning  
and  
The Lecture



# Advance Organizer

“The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly.”

David Ausubel - *Educational psychology: A cognitive approach*, 1968.

# Quick Thinks

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- P Reorder the steps
- P Paraphrase the idea
- P Correct the error
- P Support a statement
- P Select the response

Johnston, S. & Cooper, J. 1997. Quick thinks: Active-thinking in lecture classes and televised instruction. *Cooperative learning and college teaching*, 8(1), 2-7.

# Formulate-Share-Listen-Create

Informal Cooperative Learning Group  
Introductory Pair Discussion of a

## FOCUS QUESTION

1. **Formulate** your response to the question individually
2. **Share** your answer with a partner
3. **Listen** carefully to your partner's answer
4. Work together to **Create** a new answer through discussion

# Minute Paper

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- P What was the most useful or meaningful thing you learned during this session?
- P What question(s) remain uppermost in your mind as we end this session?
- P What was the “muddiest” point in this session?
- P Give an example or application
- P Explain in your own words . . .

Angelo, T.A. & Cross, K.P. 1993. *Classroom assessment techniques: A handbook for college teachers*. San Francisco: Jossey Bass.

# Informal CL (Book Ends on a Lecture) with Concept Tests

## Physics

### **Peer Instruction**

Eric Mazur - Harvard – <http://galileo.harvard.edu>

Peer Instruction [www.prenhall.com](http://www.prenhall.com)

Richard Hake (Interactive engagement vs traditional methods) <http://carini.physics.indiana.edu/SDI/>

## Chemistry

### **Chemistry ConceptTests**

Art Ellis - UW Madison – [www.chem.wisc.edu/~concept](http://www.chem.wisc.edu/~concept)

ModularChem Consortium –  
<http://mc2.cchem.berkeley.edu/>

## **Thinking Together video**

Derek Bok Center – [www.fas.harvard.edu/~bok\\_cen/](http://www.fas.harvard.edu/~bok_cen/)

Richard Hake (Interactive engagement vs traditional methods)  
<http://carini.physics.indiana.edu/SDI/>

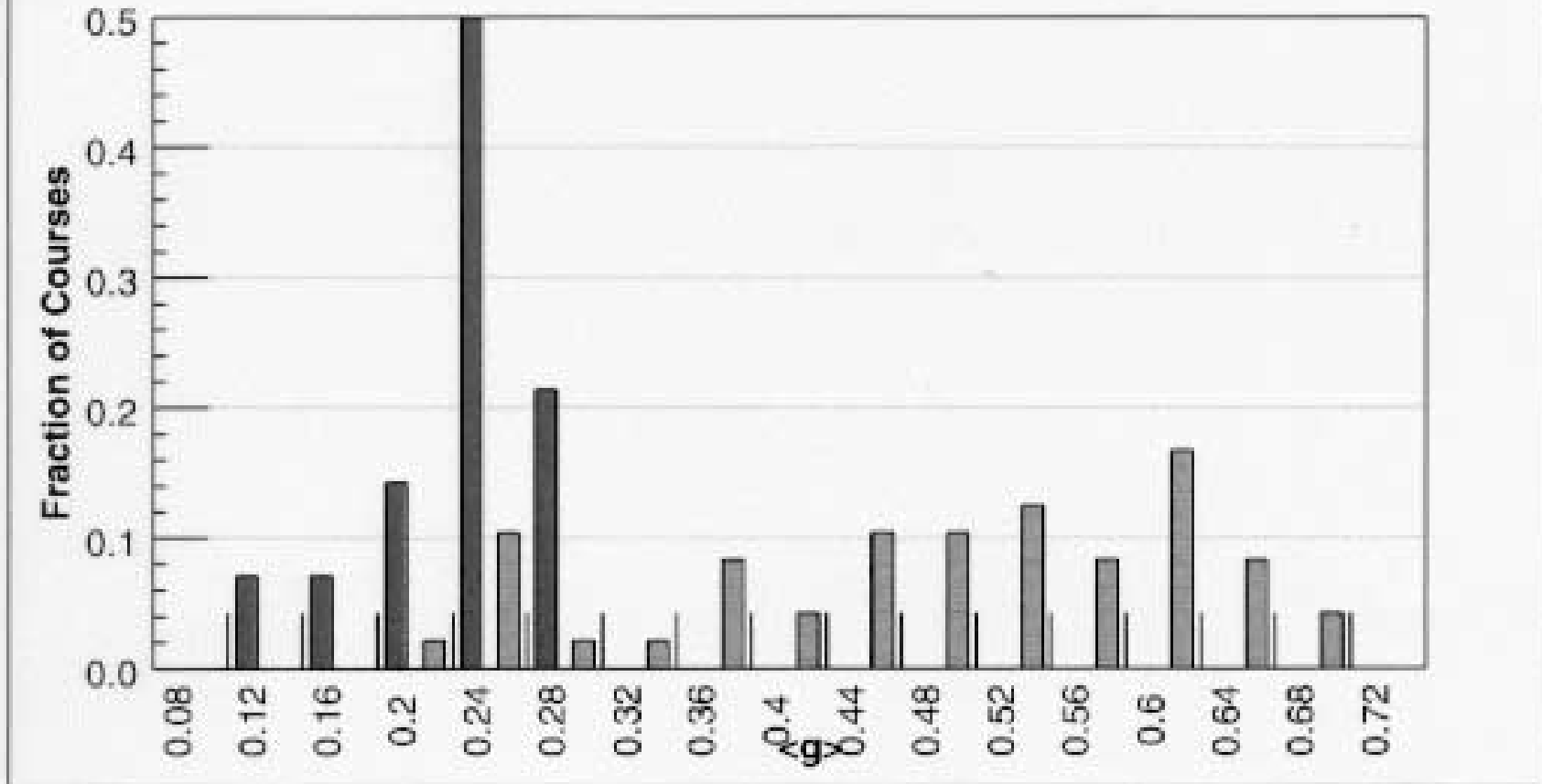


Fig. 2. Histogram of the average normalized gain  $\langle g \rangle$ : dark (red) bars show the *fraction* of 14 traditional courses (N = 2084), and light (green) bars show the *fraction* of 48 interactive engagement courses (N = 4458), both within bins of width  $\delta\langle g \rangle = 0.04$  centered on the  $\langle g \rangle$  values shown.

<http://www.asme.org/educate>



### III. CONCEPTUAL TEST RESULTS

#### A. Gain vs Pretest Graph - All Data

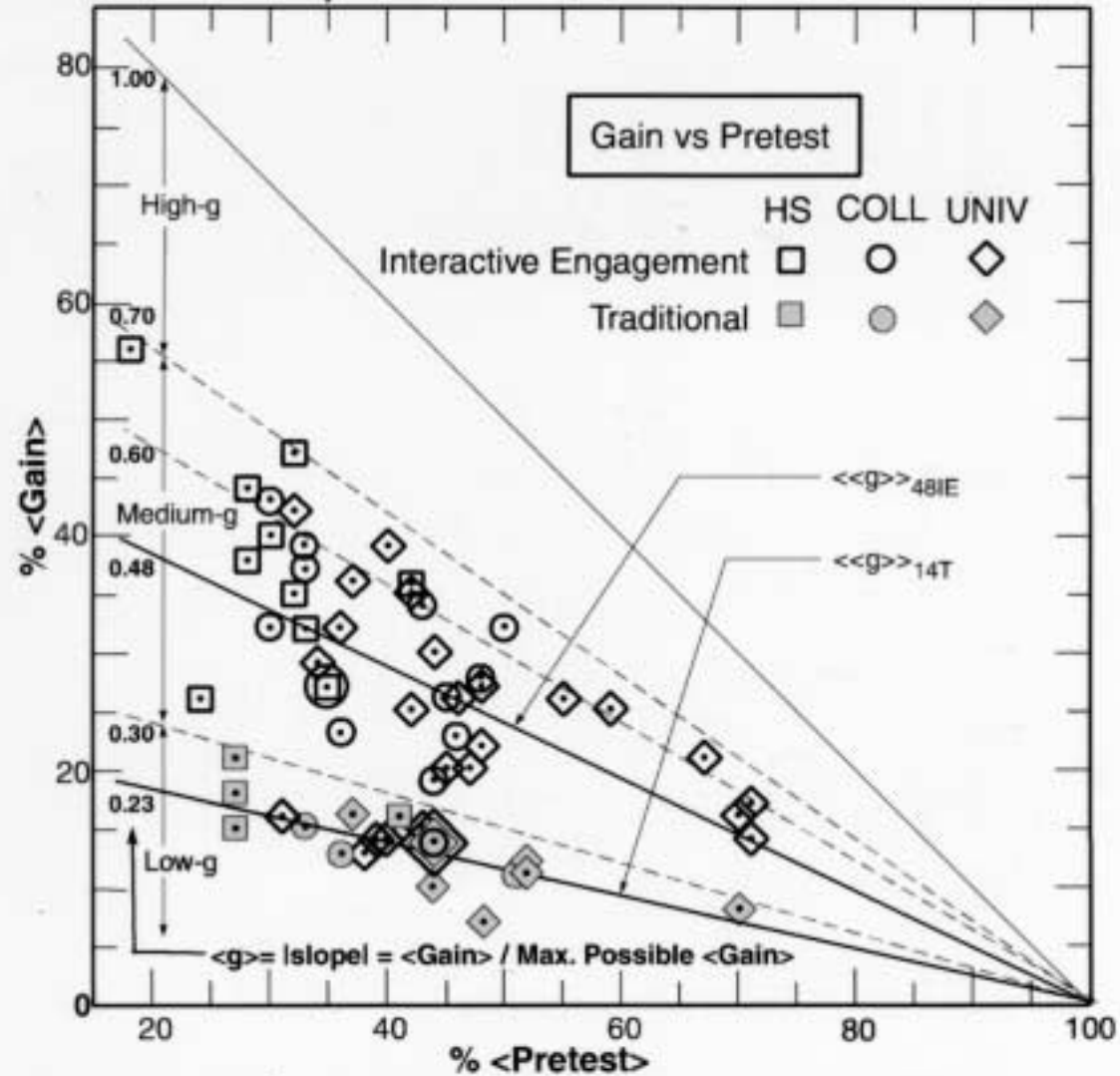


Fig. 1. %<Gain> vs %<Pretest> score on the conceptual Mechanics Diagnostic (MD) or Force Concept Inventory (FCI) tests for 62 courses enrolling a total N = 6542 students: 14 traditional (T) courses (N = 2084) which made little or no use of interactive engagement (IE) methods, and 48 IE courses (N = 4458) which made considerable use of IE methods. Slope lines for the average of the 14 T courses  $\langle\langle g \rangle\rangle_{14T}$  and 48 IE courses  $\langle\langle g \rangle\rangle_{48IE}$  are shown, as explained in the text.

## **Informal Cooperative Learning Groups**

Can be used at any time

Can be short term and ad hoc

May be used to break up a long lecture

Provides an opportunity for students to process material they have been listening to

Are especially effective in large lectures

Include "book ends" procedure

Are not as effective as Formal Cooperative Learning or Cooperative Base Groups

# **Session Summary**

## **(Minute Paper)**

### **Reflect on the session:**

1. What were the most important points for you?
2. What is one thing you would be willing to try?
3. What questions do you have?

### **Discuss with a partner:**

1. Points that were useful, meaningful, interesting, applicable, etc.
2. Questions that you have.

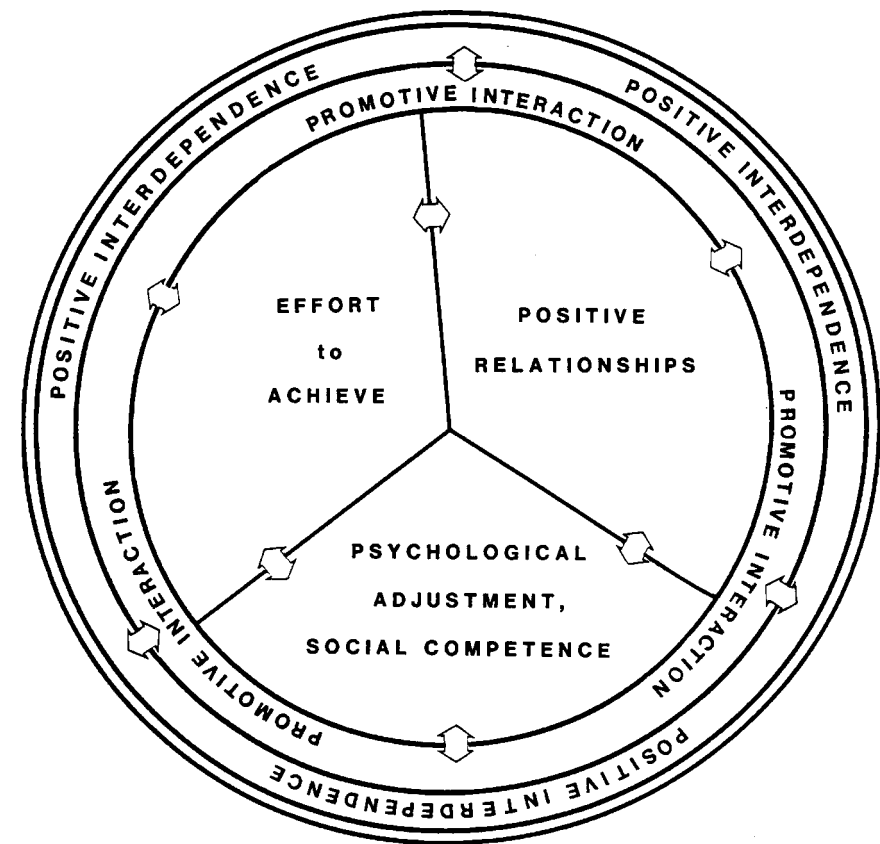
# Cooperative Learning Research Support

(Johnson, Johnson & Smith, *Change*, 1998, 30(4), 26-35)

- ! Over 300 Experimental Studies
- ! First study conducted in 1924
- ! High Generalizability
- ! Multiple Outcomes

## Outcomes

1. Achievement and retention
2. Critical thinking and higher-level reasoning
3. Differentiated views of others
4. Accurate understanding of others' perspectives
5. Liking for classmates and teacher
6. Liking for subject areas
7. Teamwork skills



# Small-Group Learning: Meta-analysis

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Springer, L., Stanne, M. E., & Donovan, S. 1999. Effects of small-group learning on undergraduates in science, mathematics, engineering, and technology: A meta-analysis. *Review of Educational Research*, 69(1), 21-52.

Small-group (predominantly cooperative) learning in postsecondary science, mathematics, engineering, and technology (SMET). 383 reports from 1980 or later, 39 of which met the rigorous inclusion criteria for meta-analysis.

**The main effect of small-group learning on achievement, persistence, and attitudes among undergraduates in SMET was significant and positive.** Mean effect sizes for achievement, persistence, and attitudes were 0.51, 0.46, and 0.55, respectively.

NEW DIRECTIONS FOR TEACHING AND LEARNING



Strategies for Energizing  
Large Classes:  
From Small Groups to  
Learning Communities

Jean MacGregor, James L. Cooper,  
Karl A. Smith, Pamela Robinson

EDITORS

NUMBER 81, SPRING 2000  
JOSSEY-BASS PUBLISHERS

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New Directions for  
Teaching and Learning,  
No. 81, 2000.  
Jossey- Bass

## The Harvard Assessment Seminars – Richard J. Light

All the specific findings point to, and illustrate, one main idea. It is that students who get the most out of college, who grow the most academically, and who are the happiest, organize their time to include interpersonal activities with faculty members, or with fellow students, built around substantive, academic work.

Environmental Factors That Enhance Students' Academic  
and Personal Development and Satisfaction

**Alexander Astin in *What matters in college:  
Four critical years revisited.* Jossey-Bass, 1993.**

**Student-student interaction**

**Student-faculty interaction**

A faculty that is very student-oriented

Discussing racial/ethnic issues with other students

Hours devoted to studying – **Time on task**

Tutoring other students

Socializing with students of different race/ethnicity

A student body that has high socioeconomic status

An institutional emphasis on diversity

A faculty that is positive about the general education program

A student body that values altruism and social activism

Good teaching comes from the identity and integrity of the teacher.  
. . Good teachers possess a capacity for connectedness.

Parker J. Palmer in *The courage to teach: Exploring the inner landscape of a teacher's life*.  
Jossey-Bass, 1998.



# Cooperative Learning

## Positive Interdependence

### Task Interdependence

1. Factory-line
2. Chain Reaction

### Identity Interdependence

Mutual identity (name, motto, etc.)

### Resource Interdependence

1. Limit resources (one set of materials)
2. Jigsaw materials
3. Separate Contributions

### Environmental Interdependence

1. Designated classroom space
2. Group has special meeting place

### Duty (Role) Interdependence

Assign each member a role and rotate them

### Fantasy Interdependence

Hypothetical interdependence in situation  
("You are a scientific/literary prize team, lost on the moon, etc.")

### Reward/Celebration Interdependence

1. Celebrate joint success
2. Bonus points
3. Nonacademic rewards (Food, free time, etc.)
4. Single group grade (when fair to all)

### Outside Challenge Interdependence

1. Intergroup competition
2. Other class competition

### Goal Interdependence (essential)

1. All members show mastery
2. All members improve
3. Add group member scores to get an overall group score
4. One product from group that all helped with and can explain

## Individual Accountability

### Ways to ensure no slackers:

- Keep group size small
- Assign roles
- Randomly ask one member of the group to explain the learning
- Have students do work before group meets
- Have students use their group learning to do an individual task afterward
- Everyone signs: "I participated, I agree, and I can explain the information"
- Observe & record individual contributions

### Ways to ensure that all members learn:

- Practice tests
- Edit each other's work and sign agreement
- Randomly check one paper from each group
- Give individual tests
- Assign the role of **checker** who has each group member explain out loud
- Simultaneous explaining: each student explains their learning to a new partner

## Face-to-Face Interaction

### Structure:

- Time for groups to meet
- Group members close together
- Small group size of two or three
- Frequent oral rehearsal
- Strong positive interdependence
- Commitment to each other's learning
- Positive social skill use
- Celebrations for encouragement, effort, help, and success!

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