Informal Cooperative Learning – Design, Implementation and Assessment

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Session Layout

• Welcome & Overview
• Pedagogies of Engagement – Cooperative Learning and Challenge Based Learning
  – Informal Cooperative Learning – Bookends on a Class Session
  – Formal Cooperative Learning
• Design and Implementation
Participant Learning Goals (Objectives)

- Describe key features of Cooperative Learning
- Explain rationale for Pedagogies of Engagement, especially Cooperative Learning & Challenge Based Learning
- Describe key features of the Understanding by Design and How People Learn
- Apply cooperative learning to classroom practice
- Identify connections between cooperative learning and desired outcomes of courses and programs

Reflection and Dialogue

- Individually reflect on your practice of Informal Cooperative Learning (or Active Learning). Write for about 1 minute
  - Key ideas, insights, applications – Success Stories
  - Questions, concerns, challenges
- Discuss with your neighbor for about 2 minutes
  - Select one Insight, Success Story, Comment, Question, etc. that you would like to present to the whole group if you are randomly selected
Pedagogies of Engagement

Cooperative Learning Introduced to Engineering – 1981

"Throughout the whole enterprise, the core issue, in my view, is the mode of teaching and learning that is practiced. Learning ‘about’ things does not enable students to acquire the abilities and understanding they will need for the twenty-first century. We need new **pedagogies of engagement** that will turn out the kinds of resourceful, engaged workers and citizens that America now requires.”

**Russ Edgerton** (reflecting on higher education projects funded by the Pew Memorial Trust)


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<tr>
<th>Methods Used in “All” or “Most”</th>
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<th>All – 2008</th>
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http://www.heri.ucla.edu/index.php
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

Active Learning: Cooperation in the College Classroom

- **Informal** Cooperative Learning Groups
- **Formal** Cooperative Learning Groups
- Cooperative **Base** Groups

Notes: Cooperative Learning Handout (CL College-804.doc)

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Book Ends on a Class Session

Book Ends on a Class Session

1. Advance Organizer
2. Formulate-Share-Listen-Create (Turn-to-your-neighbor) -- repeated every 10-12 minutes
3. Session Summary (Minute Paper)
   1. What was the most useful or meaningful thing you learned during this session?
   2. What question(s) remain uppermost in your mind as we end this session?
   3. What was the "muddiest" point in this session?

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

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


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

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


Session Summary
(Minute Paper)

Reflect on the session:

1. Most interesting, valuable, useful thing you learned.
2. Things that helped you learn.
3. Question, comments, suggestions.
4. Pace: Too slow 1 . . . 5 Too fast
5. Relevance: Little 1 . . . 5 Lots
6. Instructional Format: Ugh 1 . . . 5 Ah
Q4 – Pace: Too slow 1 . . . . 5 Too fast (3.2)
Q5 – Relevance: Little 1 . . . 5 Lots (3.9)
Q6 – Format: Ugh 1 . . . 5 Ah (4.0)

Q4 – Pace: Too slow 1 . . . . 5 Too fast (2.9)
Q5 – Relevance: Little 1 . . . 5 Lots (3.9)
Q6 – Format: Ugh 1 . . . 5 Ah (3.7)
Informal CL (Book Ends on a Class Session) with Concept Tests

**Physics**
- Peer Instruction

**Chemistry**
- Chemistry ConcepTests - UW Madison
  - [www.chem.wisc.edu/~concept](http://www.chem.wisc.edu/~concept)
- Video: Making Lectures Interactive with ConcepTests

**STEMTEC**

**Harvard – Derek Bok Center**
- Thinking Together & From Questions to Concepts: Interactive Teaching in Physics
  - [www.fas.harvard.edu/~bok_cen/](http://www.fas.harvard.edu/~bok_cen/)

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The “Hake” Plot of FCI

![The “Hake” Plot of FCI](image-url)
Richard Hake (Interactive engagement vs traditional methods)  
http://www.physics.indiana.edu/~hake/

Fig. 2. Histogram of the average normalized gain \( g > \); dark (red) bars show the fraction of 14 traditional courses \( N = 2064 \), and light (green) bars show the fraction of 48 interactive engagement courses \( N = 4458 \), both within bins of width \( \Delta g > = 0.04 \) centered on the \( g > \) values shown.

Fig. 1. \% Gain vs \% Pretest score on the Conceptual Mechanics Diagnostic (CMD) or Force Concept Inventory (FCI) test for 62 courses enrolling a total \( N = 4042 \) students: 14 traditional (T) courses \( N = 2044 \) which made little or no use of interactive engagement (IE) methods, and 48 IE courses \( N = 1418 \) which made considerable use of IE methods. Error bars for the means of the 14 T courses \( g > \text{mean} \) and of IE courses \( g > \text{mean} \) are shown, as explained in the text.
Physics (Mechanics) Concepts: The Force Concept Inventory (FCI)

- A 30 item multiple choice test to probe student's understanding of basic concepts in mechanics.
- The choice of topics is based on careful thought about what the fundamental issues and concepts are in Newtonian dynamics.
- Uses common speech rather than cueing specific physics principles.
- The distractors (wrong answers) are based on students' common inferences.

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 (Cognitive Rehearsal)**

Are especially effective in large lectures
Include "book ends" procedure
Are not as effective as Formal Cooperative Learning or Cooperative Base Groups
Strategies for Energizing Large Classes: From Small Groups to Learning Communities:

Jean MacGregor, James Cooper, Karl Smith, Pamela Robinson

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

Informal Cooperative Learning Planning Form

DESCRIPTION OF THE LECTURE:
1. Lecture Topic: ____________________________
2. Objectives: Have students understand ________
3. Time Needed: ____________________________
4. Method for Assigning Students to Pairs or Teams: ____________________________
5. Method of Changing Partners Quickly: ____________________________
6. Materials needed: ________________
7. Questions to be asked: ________________

ADVANCED ORGANIZER QUESTIONS:
Questions should be aimed at preorganizing and organizing what the students know about the topic to be covered and establishing expectations as to what the lecture will cover.

1. ____________________________
2. ____________________________
3. ____________________________

COGNITIVE REHEARSAL QUESTIONS:
List the specific steps to be taken to help students understand and remember the information being presented. Students should use the questions, share, discuss, and create procedures.

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________

SUMMARY QUESTIONS:
Give students direction and require students to summarize, some time during the interval or afterward, sign up to post to the board. Can you explain why you think ________? What are the implications of ________? What is the importance of ________? What role does ________ play in the context of ________?

1. ____________________________
2. ____________________________

CELEBRATE STUDENTS' HARD WORK

1. ____________________________
2. ____________________________
Design and Implementation of Cooperative Learning – Resources

- **Design Framework – How People Learn (HPL) & Backward Design Process**
  - Pellegrino – Rethinking and redesigning curriculum, instruction and assessment: What contemporary research and theory suggests

- **Content Resources**

- **Cooperative Learning – Instructional Format explanation and exercise to model format and to engage workshop participants**
  - Cooperative Learning (Johnson, Johnson & Smith)
    - Smith web site – www.ce.umn.edu/~smith

- **Other Resources**
  - University of Delaware PBL web site – www.udel.edu/pbl