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
### Formal Cooperative Learning – Types of Tasks

1. Jigsaw – Learning new conceptual/procedural material
2. Peer Composition or Editing
3. Reading Comprehension/Interpretation
4. **Problem Solving, Project, or Presentation**
5. Review/Correct Homework
6. Constructive Academic Controversy
7. Group Tests

### Challenge-Based Learning

- Problem-based learning
- Case-based learning
- Project-based learning
- Learning by design
- Inquiry learning
- Anchored instruction

*John Bransford, Nancy Vye and Helen Bateman. Creating High-Quality Learning Environments: Guidelines from Research on How People Learn*
Professor's Role in Formal Cooperative Learning

1. Specifying Objectives
2. Making Decisions
3. Explaining Task, Positive Interdependence, and Individual Accountability
4. Monitoring and Intervening to Teach Skills
5. Evaluating Students’ Achievement and Group Effectiveness

Decisions, Decisions

Group size?
Group selection?
Group member roles?
How long to leave groups together?
Arranging the room?
Providing materials?
Time allocation?
Formal Cooperative Learning Task Groups


Problem Based Cooperative Learning Format

**TASK:** Solve the problem(s) or Complete the project.

**INDIVIDUAL:** Estimate answer. Note strategy.

**COOPERATIVE:** One set of answers from the group, strive for agreement, make sure everyone is able to explain the strategies used to solve each problem.

**EXPECTED CRITERIA FOR SUCCESS:** Everyone must be able to explain the strategies used to solve each problem.

**EVALUATION:** Best answer within available resources or constraints.

**INDIVIDUAL ACCOUNTABILITY:** One member from your group may be randomly chosen to explain (a) the answer and (b) how to solve each problem.

**EXPECTED BEHAVIORS:** Active participating, checking, encouraging, and elaborating by all members.

**INTERGROUP COOPERATION:** Whenever it is helpful, check procedures, answers, and strategies with another group.
Team Member Roles

- Observer/ Process Recorder
- Task Recorder
- Skeptic/Prober

<table>
<thead>
<tr>
<th>Action</th>
<th>Name 1</th>
<th>Name 2</th>
<th>Name 3</th>
<th>Name 4</th>
<th>Total</th>
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<tr>
<td>Contributes Ideas</td>
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<td>Describes Feelings</td>
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<td>Encourages Participation</td>
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<td>Summarizes, Integrates</td>
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<td>Checks for Understanding</td>
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<td>Relates New To Old Learning</td>
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<td>Gives Direction To Work</td>
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<td>Total</td>
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</table>
Technical Estimation Exercise

TASK:
INDIVIDUAL: Quick Estimate (10 seconds). Note strategy.

COOPERATIVE: Improved Estimate (15 minutes). One set of answers from the group, strive for agreement, make sure everyone is able to explain the strategies used to arrive at the improved estimate.

EXPECTED CRITERIA FOR SUCCESS: Everyone must be able to explain the strategies used to arrive at your improved estimate.

EVALUATION: Best answer within available resources or constraints.

INDIVIDUAL ACCOUNTABILITY: One member from your group may be randomly chosen to explain (a) your estimate and (b) how you arrived at it.

EXPECTED BEHAVIORS: Active participating, checking, encouraging, and elaborating by all members.

INTERGROUP COOPERATION: Whenever it is helpful, check procedures, answers, and strategies with another group.

Group Reports

• Number of Ping Pong Balls
  – Group 1
  – Group 2
  – . . .

• Strategy used to arrive at estimate – assumptions, model, method, etc.
Problem-Based Learning

Problem posed

1. Learn it
2. Apply it
3. Identify what we need to know

Subject-Based Learning

Given problem to illustrate how to use it

1. Learn it
2. Told what we need to know

Normative Professional Curriculum:

1. Teach the relevant basic science,
2. Teach the relevant applied science, and
3. Allow for a practicum to connect the science to actual practice.
Problem-Based Learning (PBL)

Problem-based learning is the learning that results from the process of working toward the understanding or resolution of a problem. The problem is encountered first in the learning process – Barrows and Tamlyn, 1980

Core Features of PBL

• Learning is student-centered
• Learning occurs in small student groups
• Teachers are facilitators or guides
• Problems are the organizing focus and stimulus for learning
• Problems are the vehicle for the development of clinical problem-solving skills
• New information is acquired through self-directed learning

Group Processing

Plus/Delta Format

<table>
<thead>
<tr>
<th>Plus (+)</th>
<th>Delta (Δ)</th>
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</thead>
<tbody>
<tr>
<td>Things That Group Did Well</td>
<td>Things Group Could Improve</td>
</tr>
</tbody>
</table>
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Modeling

Modeling in its broadest sense is the cost-effective use of something in place of something else for some cognitive purpose (Rothenberg, 1989). A model represents reality for the given purpose; the model is an abstraction of reality in the sense that it cannot represent all aspects of reality.

Any model is characterized by three essential attributes: (1) Reference: It is of something (its "referent"); (2) Purpose: It has an intended cognitive purpose with respect to its referent; (3) Cost-effectiveness: It is more cost-effective to use the model for this purpose than to use the referent itself.

Modeling Heuristics

1. Do not build a complicated model when a simple one will suffice.
2. Beware of molding the problem to fit the technique.
3. The deduction phase of modeling must be conducted rigorously.
4. Models should be validated prior to implementation.
5. A model should never be taken too literally.
6. A model should neither be pressed to do, nor criticized for failing to do, that for which it was never intended.
7. Beware of overselling a model.
8. Some of the primary benefits of modeling are associated with the process of developing the model.
9. A model cannot be any better than the information that goes into it.
10. Models cannot replace decision makers.

Modeling Resources