

Effective Designs and Practices for Problem-Based Cooperative Learning (PBCL)

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Top Three Main Engineering Work Activities

(Burton, Parker & LeBold, 1998)

Engineering Total

- Design – 36%
- Computer applications – 31%
- Management – 29%

Civil/Architectural

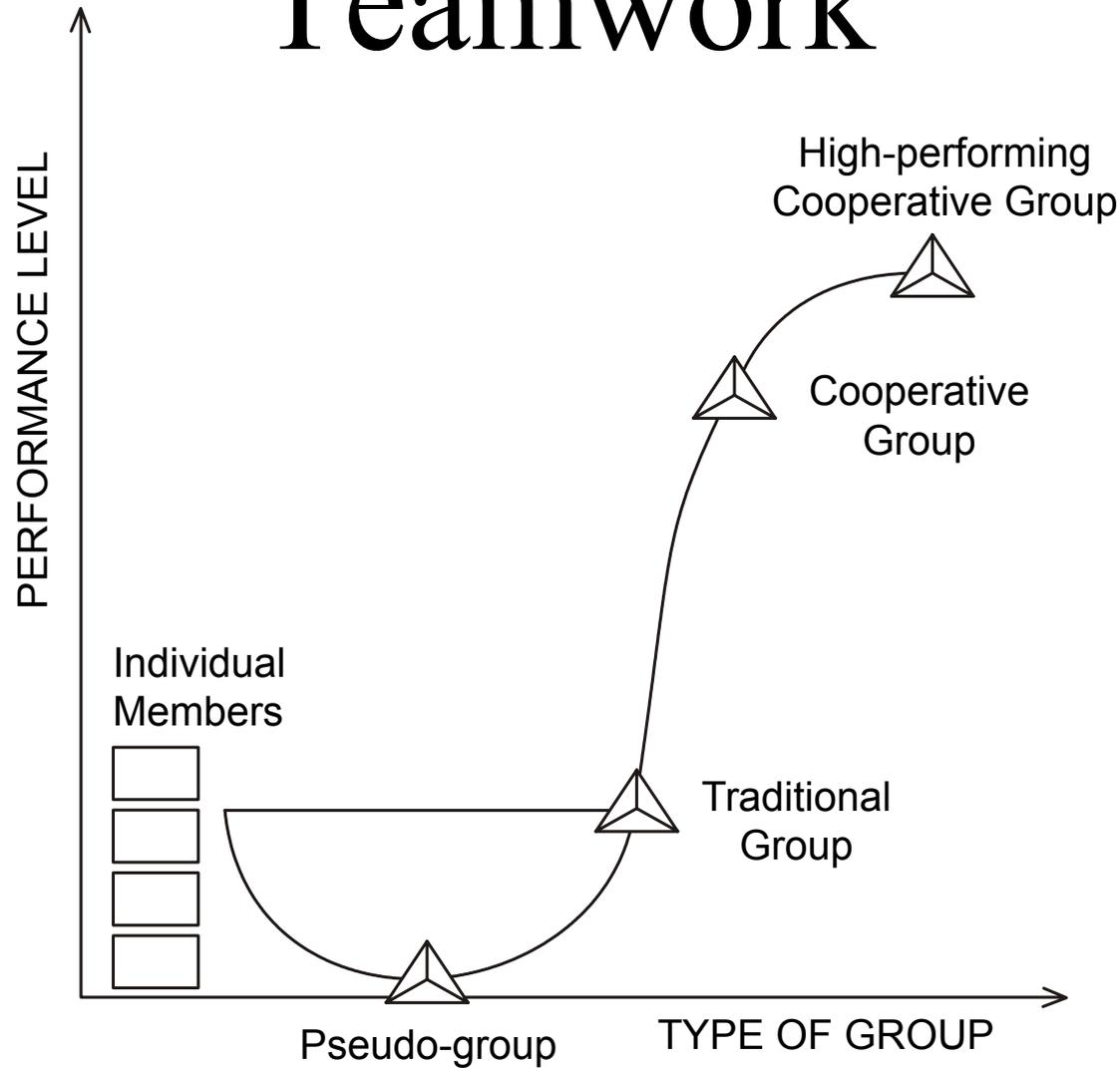
1. Management – 45%
2. Design – 39%
3. Computer applications – 20%

Burton, L., Parker, L, & LeBold, W. 1998. U.S. engineering career trends. *ASEE Prism*, 7(9), 18-21.

Design team failure is usually due to failed team dynamics (Leifer, Koseff & Lenshow, 1995).

It's the soft stuff that's hard, the hard stuff is easy (Doug Wilde, quoted in Leifer, 1997)

Teamwork



A team is a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable

- SMALL NUMBER
- COMPLEMENTARY SKILLS
- COMMON PURPOSE & PERFORMANCE GOALS
- COMMON APPROACH
- MUTUAL ACCOUNTABILITY

--Katzenbach & Smith (1993)

The Wisdom of Teams

Six Basic Principles of Team Discipline

- ! Keep team membership small
- ! Ensure that members have complimentary skills
- ! Develop a common purpose
- ! Set common goals
- ! Establish a commonly agreed upon working approach
- ! Integrate mutual and individual accountability

--Katzenbach & Smith (2001) *The Discipline of Teams*

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

Teamwork Skills

- Communication
- Listening and Persuading
- Decision Making
- Conflict Management
- Leadership

Group Task and Maintenance Roles

Group Task Roles	Group Maintenance Roles
Initiating	Encouraging
Seeking Information	Expressing Feelings
Giving Information	Harmonizing
Seeking Opinions	Compromising
Giving Opinions	Facilitating Communications
Clarifying	Setting Standards or Goals
Elaborating	Testing Agreement
Summarizing	Following

•Team Charter

- Team name, membership, and roles
- Team Mission Statement
- Anticipated results (goals)
- Specific tactical objectives
- Ground rules/Guiding principles for team participation
- Shared expectations/aspirations

Code of Cooperation

- EVERY member is responsible for the team's progress and success.
- Attend all team meetings and be on time.
- Come prepared.
- Carry out assignments on schedule.
- Listen to and show respect for the contributions of other members; be an active listener.
- CONSTRUCTIVELY criticize ideas, not persons.
- Resolve conflicts constructively,
- Pay attention, avoid disruptive behavior.
- Avoid disruptive side conversations.
- Only one person speaks at a time.
- Everyone participates, no one dominates.
- Be succinct, avoid long anecdotes and examples.
- No rank in the room.
- Respect those not present.
- Ask questions when you do not understand.
- Attend to your personal comfort needs at any time but minimize team disruption.
- HAVE FUN!!
- ?

Ten Commandments: An Affective Code of Cooperation

- Help each other be right, not wrong.
- Look for ways to make new ideas work, not for reasons they won't.
- If in doubt, check it out! Don't make negative assumptions about each other.
- Help each other win, and take pride in each other's victories.
- Speak positively about each other and about your organization at every opportunity.
- Maintain a positive mental attitude no matter what the circumstances.
- Act with initiative and courage, as if it all depends on you.
- Do everything with enthusiasm; it's contagious.
- Whatever you want; give it away.
- Don't lose faith.
- Have fun

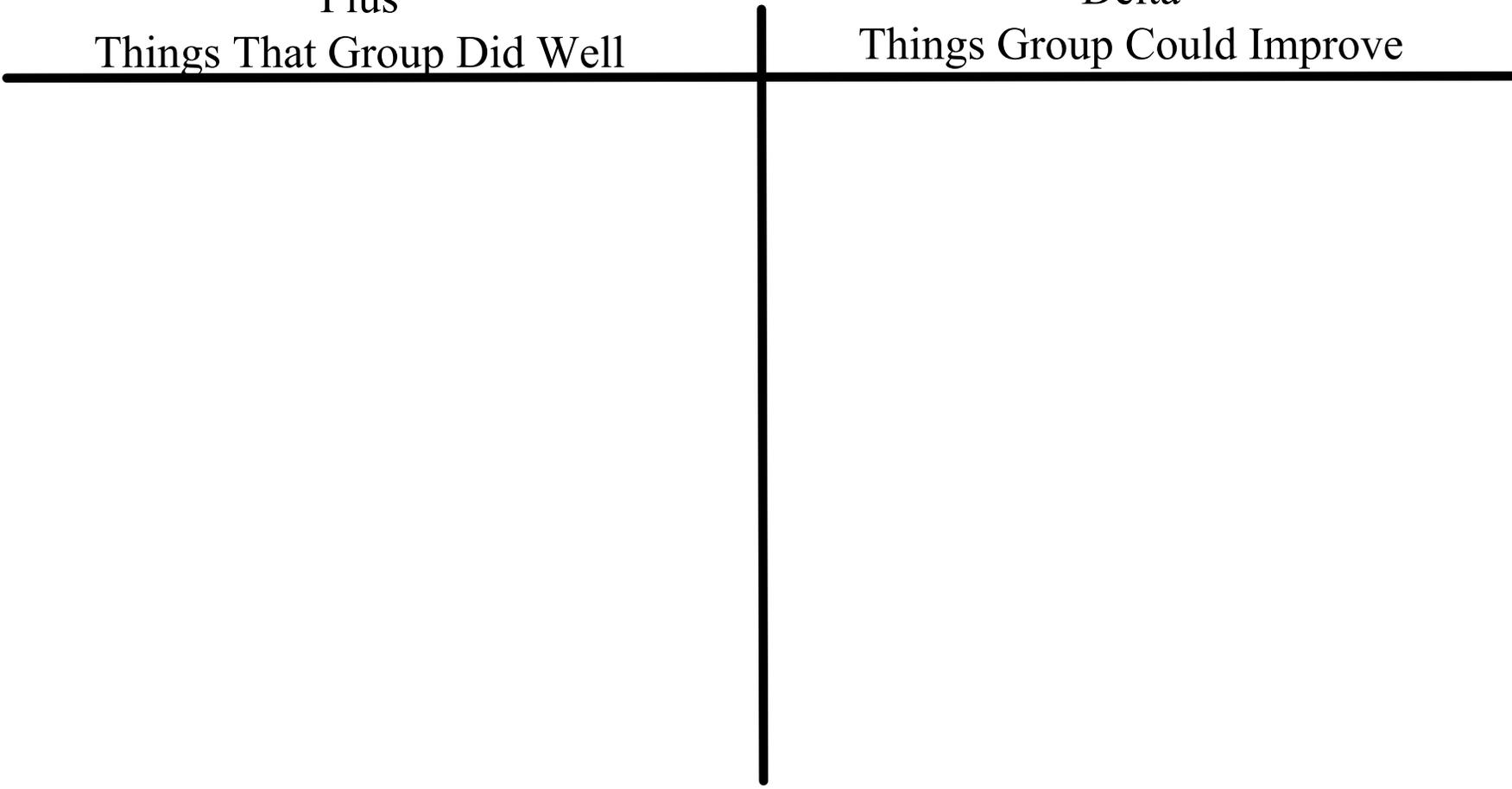
Group Processing Plus/Delta Format

Plus

Things That Group Did Well

Delta

Things Group Could Improve



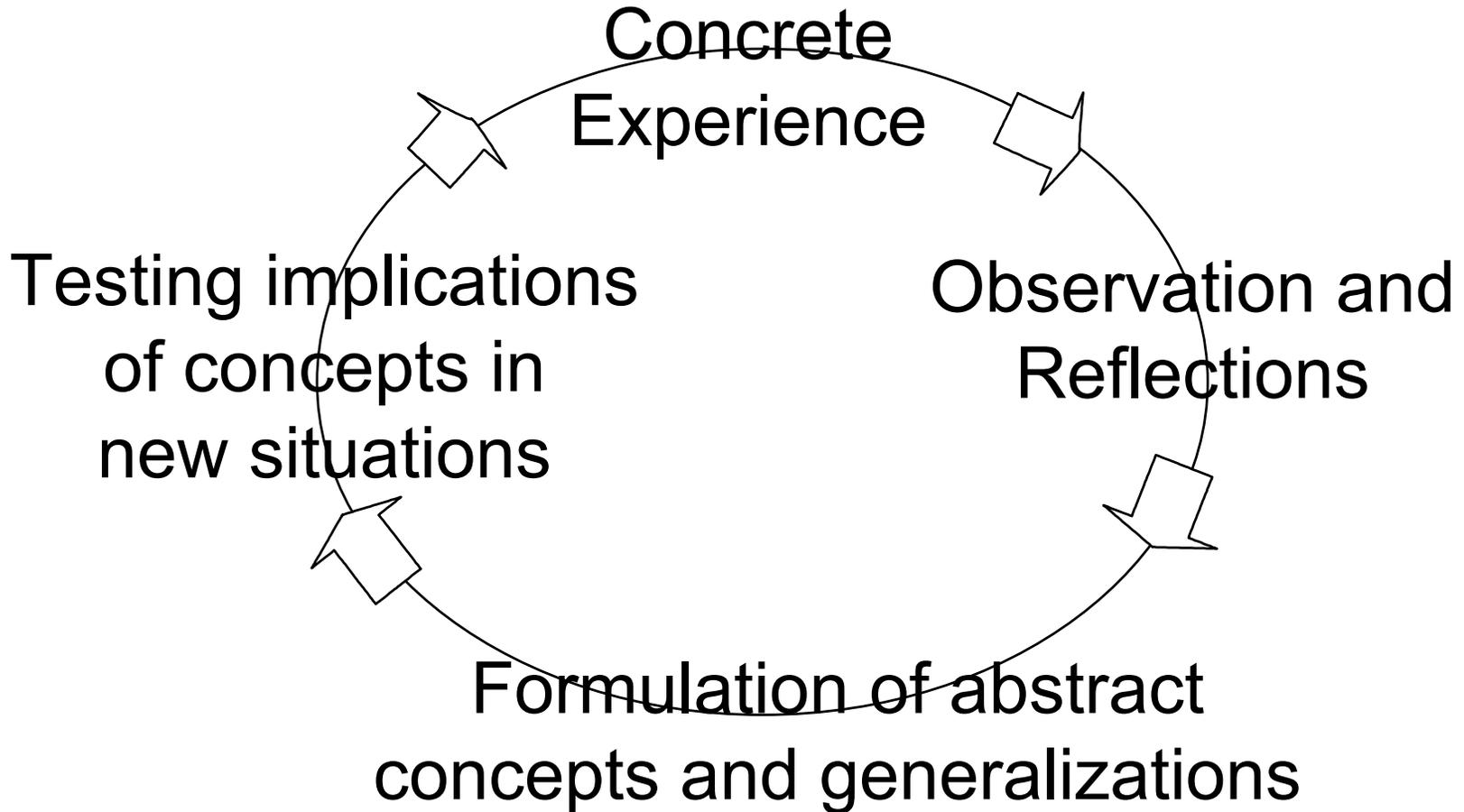
Formal Cooperative Learning

1. Jigsaw
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

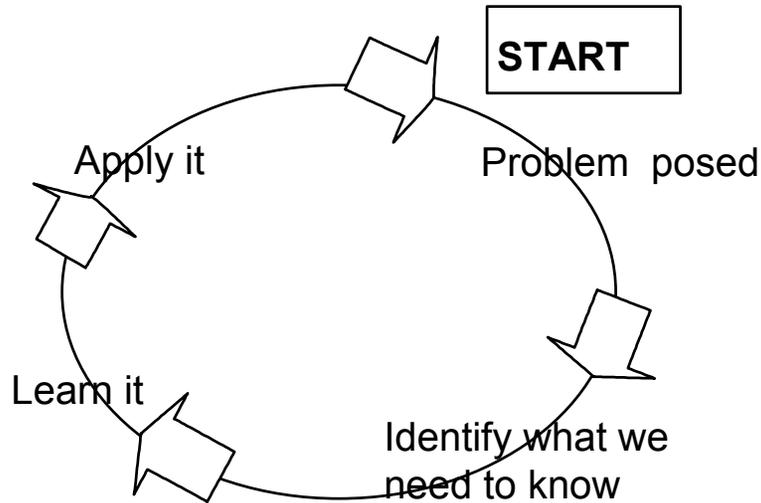
Professor's Role in Formal Cooperative Learning

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

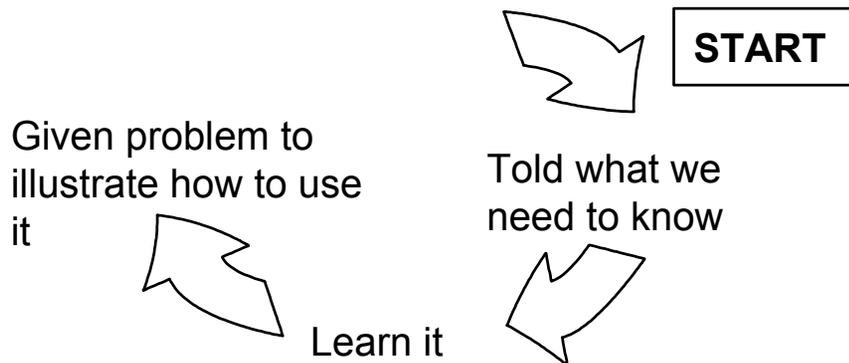
Kolb's Experiential Learning Cycle



Problem-Based Learning



Subject-Based Learning



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 B 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

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.

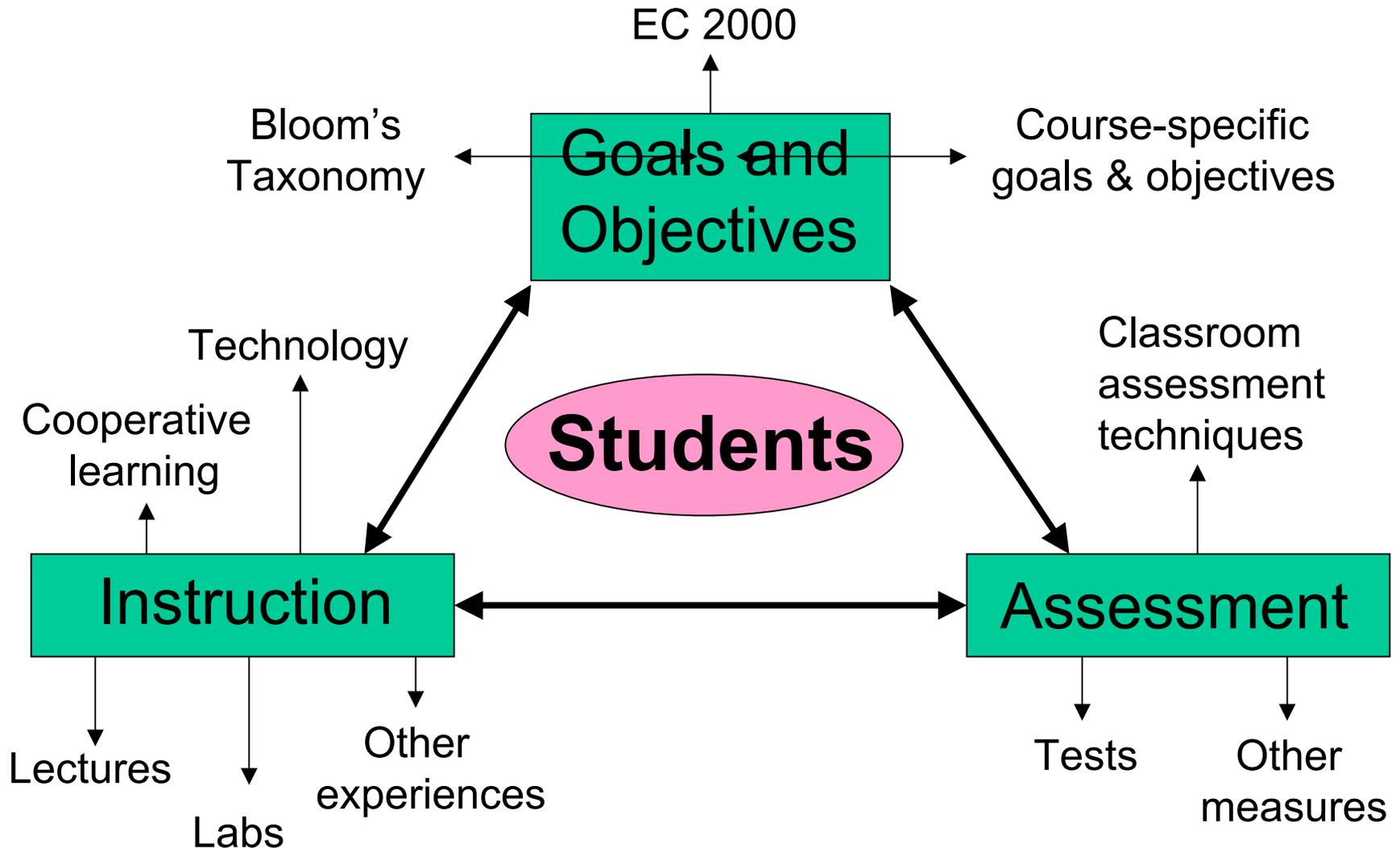
EVALUATION: Best answer within available resources or constraints.

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.

Effective Course Design



Felder & Brent, 1999

Backward Design

Stage 1. Identify Desired Results

Stage 2. Determine Acceptable Evidence

Stage 3. Plan Learning Experiences and Instruction

Backward Design

Stage 1. Identify Desired Results

Filter 1. To what extent does the idea, topic, or process represent a “big idea” having enduring value beyond the classroom?

Filter 2. To what extent does the idea, topic, or process reside at the heart of the discipline?

Filter 3. To what extent does the idea, topic, or process require uncoverage?

Filter 4. To what extent does the idea, topic, or process offer potential for engaging students?

Understanding by Design

Wiggins & McTighe

Design (vb) – To have purposes and intentions; to plan and execute (Oxford English Dictionary)

Backward Design

Conceptual framework, design process, and accompanying set of design standards

A way to design or redesign any curriculum to make student understanding more likely

Wiggins, G. & McTighe, J. 1998. Understanding by design. ASCD.