

Cooperative Problem- Based Learning Constructive Controversy



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Overall Goals

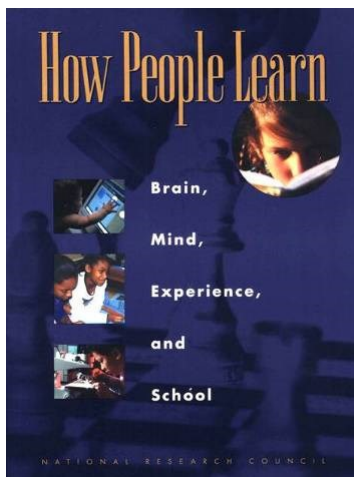
- ☐ Design courses to increase student learning
- ☐ Implement practices to improve student learning
- ☐ Build your knowledge of Evidence-Based Teaching Practices and your implementation repertoire

Reflection and Dialogue

- ❑ Individually reflect on effective strategies for helping students learn new material. Think/Write for about 1 minute
 - What are some effective ways of helping students learn new conceptual, procedural, or theoretical material?
 - What helps you learn new material?
- ❑ Discuss with your neighbor for about 3 minutes and record a list

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Expertise Implies:



- a set of cognitive and metacognitive skills
- an organized body of knowledge that is deep and contextualized
- an ability to notice patterns of information in a new situation
- flexibility in retrieving and applying that knowledge to a new problem

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Bransford, Brown & Cocking. 1999. *How people learn*. National Academy Press.

Acquisition of Expertise

- ❑ Cognition: Learn from instruction or observation what knowledge and actions are appropriate
- ❑ Associative: Practice (with feedback) allowing smooth and accurate performance
- ❑ Automaticity: “Compilation” or performance and associative sequences so that they can be done without large amounts of cognitive resources

“The secret of expertise is that there is no secret. It takes at least 10 years of concentrated effort to develop expertise.”
Herbert Simon

Fitts P, & Posner MI. Human Performance. Belmont, CA: Brooks/Cole, 1967.

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Learning Sciences

deliberate

distributed

practice

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Key Implications

Deliberate

Attention must be paid

- ❑ Attention and processing power = cognitive load (bandwidth)
 - LIMITED – need to be careful how one uses the learner's bandwidth
 - Link to Curricular Priorities
 - Continuous partial attention
- ❑ Reflection is needed
 - Need for feedback
 - Link to assessment

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Key Implications

Distributed

- ❑ Repetition over time
 - Spaced vs. massed practice*
 - Spiral curriculum
- ❑ Multiple modes of input
 - Visual
 - Audio
 - Kinesthetic
 - Self-explanation
 - Explaining to others

*Kandel, E.B. 2007. In Search of Memory: The Emergence of a New Science of Mind. New York: Norton.

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Key Implications

Practice what you want to learn

- ☐ Active – doing something
- ☐ Constructive – adding to your prior knowledge
- ☐ Interactive – working with others to add to your prior knowledge

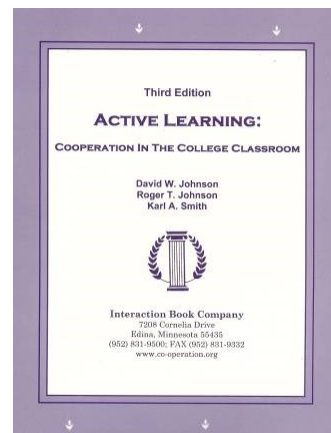
Chi, M.T.H. 2009. Active-Constructive-Interactive: A Conceptual Framework for Differentiating Learning Activities. *Topics in Cognitive Science* 1, 73–105.

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Active Learning: Cooperation in the College Classroom

- ☐ Informal Cooperative Learning Groups
- ➔ ☐ Formal Cooperative Learning Groups
- ☐ Cooperative Base Groups

Notes: Cooperative Learning Handout (CL-College-814.doc)
[\[CL-College-814.doc\]](#)



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Instructor's Role in Formal Cooperative Learning

1. Specifying **Objectives** (Academic and Social/Teamwork)
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

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Formal Cooperative Learning – Types of Tasks

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

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Reflection

Think about a time you observed conflict in your classroom in a group activity.

- ☐ What happened?
- ☐ How was it resolved?
- ☐ What if your students knew how to embrace and respectfully engage in conflict?

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What is Constructive Controversy?

“Constructive [academic] controversy is an **instructional procedure** that combines **cooperative learning** (in which students work together in small groups to develop a report on an assigned topic, for example) with **structured intellectual conflict** (in which students argue the pro and con positions on an issue in order to stimulate problem-solving and reasoned judgment).” (p. 30)

Ref: Johnson, D.W., Johnson, R.T., & Smith, K.A., “Constructive Controversy: The Educative Power of Intellectual Conflict”, *Change*, 2000, Vol. 32, No. 1, pp. 28-37.

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Why Constructive Controversy?

- ▶ ABET criteria include requirements for graduates:
 - who can function on multidisciplinary teams,
 - who can communicate effectively, and
 - who are educated sufficiently broadly to understand how engineering solutions have impact in global, economic, environmental and societal context.
- ▶ Constructive Controversy can help students develop the skills to:
 - contribute to engineering team discussions/negotiations
 - develop and articulate positions on issues
 - recognize and consider perspectives of multiple stakeholders
 - respectfully and successfully navigate group conflict

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Theory and Evidence

Theory: Processes through which intellectual conflict leads to positive outcomes has been theorized by **developmental, cognitive, social, personality, communication, and organizational** researchers (Johnson & Johnson, 2009)

Evidence: 39 studies (41% Higher Ed), meta-analysis

- Achievement, Retention, and Quality of Decision Making and Problem Solving – Effect Size, ES = 0.70 (concurrence seeking), 0.62 (debate), 0.76 (individualistic)
- Cognitive and Moral Reasoning – ES = 0.84 (concurrence seeking, 1.38 (debate), 1.10 (individualistic)
- Similar ES's for Perspective Taking, Open-Mindedness, Creativity, Task Involvement, Motivation to Improve Understanding, Attitude Change on the Issue, Attitudes toward Controversy and Toward the Task, ...

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Controversy with Civility – recognize that differences of viewpoint are inevitable and that such differences must be aired openly but with civility. Civility implies respect for others, a willingness to hear about each other's viewpoints, and the exercise of restraint in criticizing the views and actions of others. Controversy can often lead to new, creative solutions to problems, especially when it occurs in an atmosphere of civility, collaboration, and common purpose.

Astin, H.S. and Astin, A.W. 1996. *A social change model of leadership development*. Los Angeles, CA: The Regents of The University of California.

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Notes on Skilled Disagreement

- ▶ Define Decision as a mutual problem, not as a win-lose situation.
- ▶ Be critical of ideas, not people (Confirm others' competence while disagreeing with their positions).
- ▶ Separate one's personal worth from others' reactions to one's ideas.
- ▶ Differentiate before trying to integrate.
- ▶ Take others' perspectives before refuting their ideas.
- ▶ Give everyone a fair hearing.
- ▶ Follow the canons of rational argument.

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Who should get the penicillin?

One pair will argue for the victims of venereal disease

One pair will argue for the victims of battle wounds

Later each team will strive for agreement on who should get the penicillin

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Constructive Academic Controversy Procedure

<u>Step</u>	<u>Typical Phrase</u>
Prepare (pairs, 10 min)	Our Best Case Is...
Present (pairs, 10 min tot)	The Answer Is...Because...
Open Discussion (group, 10 min)	Your Position is Inadequate Because... My Position is Better Because...
Perspective Reversal (pairs, Up to 5 min tot, if time available)	Your Position Is...Because...
Consensus Seeking (group, 15 min)	Our Best Reasoned Judgment Is...
Report out to larger group (10 min)	

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Preparing Positions (10 min)

- ▶ Summarize major points.
- ▶ Ensure both members present
- ▶ Use more than one medium.
- ▶ Present position strongly and sincerely whether you believe it or not.
- ▶ Save a few points for the discussion.

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Presenting Positions (10 min)

Pair A: Present position sincerely and thoroughly

Pair B: Listen carefully, take notes

Pairs: Reverse presenting/listening roles

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Discussing the Issue (10 min)

Present arguments forcefully, persuasively

- Present facts and rationale

Listen Critically

- Ask for Facts and Rationale

Present counter-arguments and rebuttals

Understand both (all) sides

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If there is time: Perspective Reversal (5 min)

- ▶ Pair A: Present opposite perspective as if it were your own

- Be forceful and persuasive
- Add arguments of your own

- ▶ Pair B: Correct errors in others' presentation of your argument

- ▶ Reverse Roles

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Reaching Consensus (15 min)

- ▶ Drop advocacy
- ▶ Summarize and synthesize best arguments
- ▶ Reach a consensus supported by facts (or summarize best arguments on all sides)
- ▶ Be sure each member can articulate arguments for both sides

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Constructive Controversy Reflection

What was the hardest part about this activity?

What did you learn?

What are the benefits of learning this way?

Where might you be able to use Constructive Controversy in your classroom?

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Controversy References

Gavin, David A. and Roberto, Michael A. 2001. What you don't know about making decisions. **Harvard Business Review**, **79** (8), 108-116.

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Constructive Controversy Processing

Things We Liked About It	Traps to Watch Out For

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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

<http://personal.cege.umn.edu/~smith/docs/Smith-CL%20Handout%2008.pdf>

Cooperative Learning	
Positive Interdependence	Individual Accountability
Goal Interdependence (essential) <ol style="list-style-type: none"> All members show mastery All members improve Add group member scores to get an overall group score One product from group that all helped with and can explain Role (Duty) Interdependence Assign each member a role and rotate them	Ways to ensure no slackers: <ul style="list-style-type: none"> Keep group size small (2-4) 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" Observe & record individual contributions
Resource Interdependence Assign each member a role and rotate them <ol style="list-style-type: none"> Limit resources (one set of materials) Jigsaw materials Separate contributions 	Ways to ensure that all members learn: <ul style="list-style-type: none"> 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
Task Interdependence <ol style="list-style-type: none"> Factory-line Chain Reaction 	Face-to-Face Interaction <ul style="list-style-type: none"> Structure: <ul style="list-style-type: none"> 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!
Outside Challenge Interdependence <ol style="list-style-type: none"> Intergroup competition Other class competition 	
Identity Interdependence Mutual identity (name, motto, etc.)	
Environmental Interdependence <ol style="list-style-type: none"> Designated classroom space Group has special meeting place 	
Fantasy Interdependence Hypothetical interdependence in situation ("You are a scientific/literary prize team, lost on the moon, etc.")	
Reward/Celebration Interdependence <ol style="list-style-type: none"> Celebrate joint success Bonus points (use with care) Single group grade (when fair to all) 	

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Cooperative Learning

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Cooperative Lesson Planning Form

Grade Level: _____ Subject Area: _____ Date: _____

Lesson: _____

Objectives

Academic: _____

Teamwork Skills: _____

Preinstructional Decisions

Group Size: _____ Method Of Assigning Students: _____

Roles: _____

Room Arrangement: _____

Materials: _____

- | | |
|----------------------|-----------------------|
| ◊ One Copy Per Group | ◊ One Copy Per Person |
| ◊ Jigsaw | ◊ Tournament |
| ◊ Other: _____ | |

Explain Task And Cooperative Goal Structure

1. Task: _____

2. Criteria For Success: _____

3. Positive Interdependence: _____

4. Individual Accountability: _____

5. Intergroup Cooperation: _____

6. Expected Behaviors: _____

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Monitoring And Intervening

1. Observation Procedure: _____ Formal _____ Informal
2. Observation By: _____ Teacher _____ Students _____ Visitors
3. Intervening For Task Assistance: _____

4. Intervening For Teamwork Assistance: _____

5. Other: _____

Evaluating And Processing

1. Assessment Of Members' Individual Learning: _____

2. Assessment Of Group Productivity: _____

3. Small Group Processing: _____

4. Whole Class Processing: _____

5. Charts And Graphs Used: _____

6. Positive Feedback To Each Student: _____

7. Goal Setting For Improvement: _____

8. Celebration: _____

9. Other: _____

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