Essential Elements of Effective Teaching

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Effective Teaching: Moving to a Student-Centered Paradigm with the Adoption of Criterion-Referenced Assessment

Hong Kong Baptist University
Centre for Holistic Teaching and Learning

28 October 2011

Reflection and Dialogue

- Individually reflect on your mental image of effective teaching. Write for about 1 minute.
  – Jot down words or phrases
  – Construct a figure or diagram
- Discuss with your neighbor for about 2 minutes
  – Describe your mental image and talk about similarities and differences
  – Select one Element, Image, Comment, Story, etc. that you would like to present to the whole group if you are randomly selected
- Whole group discussion

Teacher Mental Images About Teaching - Axelrod (1973)

Mental Image	**Motto**	**Characteristics**	**Disciplines**
Content	I teach what I know	Pour it in, Lecture	Science, Math
Instructor	I teach what I am	Modeling, Demonstration	Many
Student – Cognitive Development	I train minds	Active Learning, Discussion	English, Humanities
Student – Development of Whole Person	I work with students as people	Motivation, Self-esteem	Basic Skills Teachers

Axelrod, J. *The University Teacher as Artist.* San Francisco: Jossey-Bass, 1973.

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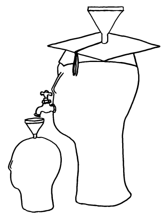
Lila M. Smith

Pedago-pathologies

Amnesia

Fantasia

Inertia



Lee Shulman – MSU Med School – PBL Approach (late 60s – early 70s), President Emeritus of the Carnegie Foundation for the Advancement of College Teaching

Shulman, Lee S. 1999. Taking learning seriously. *Change, 31* (4), 11-17.

What do we do about these pathologies?

- **Activity** – Engage learners in meaningful and purposeful activities
- **Reflection** – Provide opportunities
- **Collaboration** – Design interaction
- **Passion** – Connect with things learners care about

Shulman, Lee S. 1999. Taking learning seriously. Change, 31 (4), 11-17.

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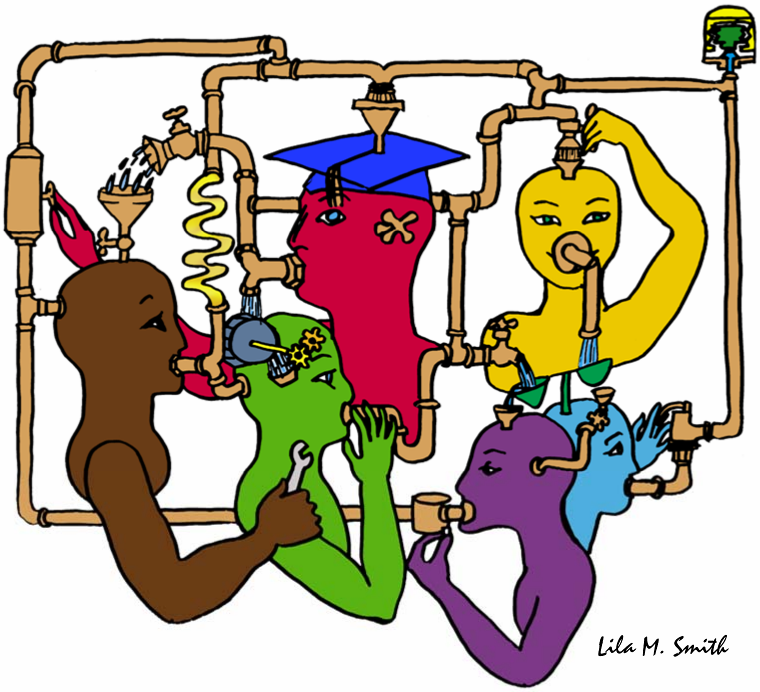

Cooperative Learning is instruction that involves people working in teams to accomplish a common goal, under conditions that involve both *positive interdependence* (all members must cooperate to complete the task) and *individual and group accountability* (each member is accountable for the complete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

Key Concepts

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

Session Objectives

- Participants will be able to :
  - Describe key differences between Teacher Centered and Learner Centered Paradigms
  - List features of effective, interactive strategies for facilitating learning
  - Describe key features of the *Understanding by Design* (UbD) process – Content (outcomes) – Assessment – Pedagogy
  - Explain key features of and rationale for Cooperative Learning
  - Identify connections between cooperative learning and desired outcomes of courses and programs
- Participants will begin applying key elements to the design on a course, class session or learning module

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Seven Principles for Good Practice in Undergraduate Education

- Good practice in undergraduate education:
  - Encourages student-faculty contact
  - Encourages cooperation among students
  - Encourages active learning
  - Gives prompt feedback
  - Emphasizes time on task
  - Communicates high expectations
  - Respects diverse talents and ways of learning

Chickering & Gamson, June, 1987

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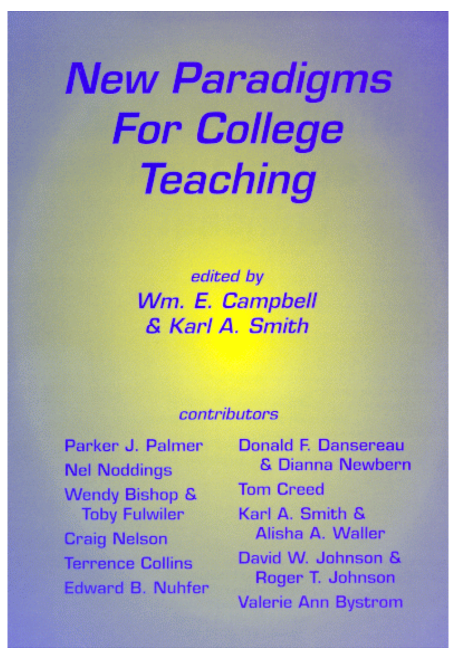
Comparison of Old and New Paradigm of Teaching (Johnson, Johnson & Smith, 1991)

	Old Paradigm	New Paradigm
Knowledge	Transferred from Faculty to Students	Jointly Constructed by Students and Faculty
Students	Passive Vessel to be Filled by Faculty's Knowledge	Active Constructor, Discoverer, Transformer of Knowledge
Faculty Purpose	Classify and Sort Students	Develop Students' Competencies and Talents
Relationships	Impersonal Relationship Among Students and Between Faculty and Students	Personal Transaction Among Students and Between Faculty and Students
Context	Competitive/Individualistic	Cooperative Learning in Classroom and Cooperative Teams Among Faculty
Teaching Assumption	Any Expert can Teach	Teaching is Complex and Requires Considerable Training

Johnson, D.W., Johnson, R.T., and Smith, K.A. *Active Learning: Cooperation in the College Classroom* (1st ed.). Edina, MN: Interaction Book Company, 1991.

Robert Barr & John Tagg. From teaching to learning: A new paradigm for undergraduate education. *Change, 27*(6), 1995.

Wm. Campbell & Karl Smith. *New Paradigms for College Teaching*. Interaction Books, 1997.



	Old Paradigm	New Paradigm
Knowledge	Transferred from Faculty to Students	Jointly Constructed by Students and Faculty
Students	Passive Vessel to be Filled by Faculty's Knowledge	Active Constructor, Discoverer, Transformer of Knowledge
Mode of Learning	Memorizing	Relating
Faculty Purpose	Classify and Sort Students	Develop Students' Competencies and Talents
Student Goals	Complete Requirements, Achieve Certification within a Discipline	Grow, Focus on Continual Lifelong Learning within a Broader System
Relationships	Impersonal Relationship Among Students and Between Faculty and Students	Personal Transaction Among Students and Between Faculty and Students
Context	Competitive/Individualistic	Cooperative Learning in Classroom and Cooperative Teams Among Faculty
Climate	Conformity/Cultural Uniformity	Diversity and Personal Esteem/ Cultural Diversity and Commonality
Power	Faculty Holds and Exercises Power, Authority, and Control	Students are Empowered; Power is Shared Among Students and Between Students and Faculty
Assessment	Norm-Referenced (i.e., Graded "On the Curve"); Typically Multiple Choice Items; Student rating of instruction at end of course	Criterion-Referenced; Typically Performances and Portfolios; Continual Assessment of Instruction
Ways of Knowing	Logico-Scientific	Narrative
Technology Use	Drill and Practice; Textbook Substitute; Chalk and Talk Substitute	Problem Solving, Communication, Collaboration, Information Access, Expression
Teaching Assumption	Any Expert can Teach	Teaching is Complex and Requires Considerable Training

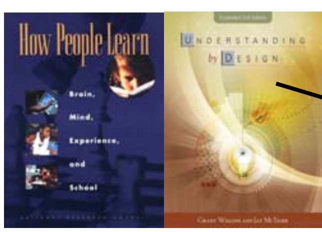
Assessment

- Old Paradigm (Teacher Centered)
  - **Norm-Reference**d (i.e., Graded "On the Curve"); Typically Multiple Choice Items; Student rating of instruction at end of course
- New Paradigm (Learner Centered)
  - **Criterion-Referenced**; Typically Performances and Portfolios; Continual Assessment of Instruction

It could well be that faculty members of the twenty-first century college or university will find it necessary to set aside their roles as teachers and instead become **designers** of learning experiences, processes, and environments.

James Duderstadt, 1999 [Nuclear Engineering Professor; Dean, Provost and President of the University of Michigan]

Design Foundations



Science of Instruction (UbD) →

Science of Learning (HPL) ↓

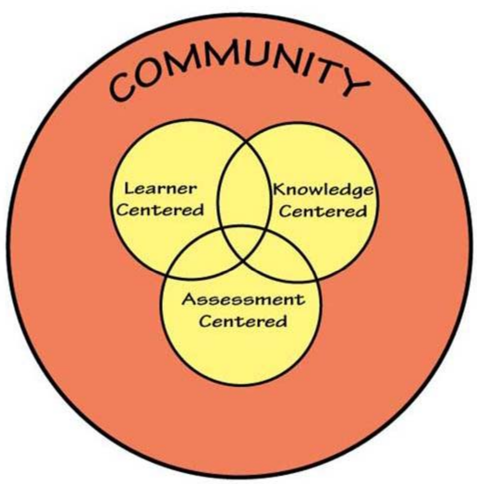
Science of Learning (HPL) \ Science of Instruction (UbD)	No	Yes
Yes	Good Theory/ Poor Practice	Good Theory & Good Practice
No		Good Practice/ Poor Theory

Sources: Bransford, Brown & Cocking. 1999. *How people learn.* National Academy Press.
Wiggins, G. & McTighe, J. 2005. *Understanding by design, 2ed*. ASCD.

Foundational Document

- Bransford, Vye and Bateman – Creating High Quality Learning Environments

Designing Learning Environments Based on HPL (How People Learn)



Understanding by Design

Wiggins & McTighe (1997, 2005)

Stage 1. Identify Desired Results

- **Enduring understanding**
- Important to know and do
- Worth being familiar with

Stage 2. Determine Acceptable Evidence

Stage 3. Plan Learning Experiences and Instruction

Overall: *Are the desired results, assessments, and learning activities ALIGNED?*

From: Wiggins, Grant and McTighe, Jay. 1997. *Understanding by Design*. Alexandria, VA: ASCD

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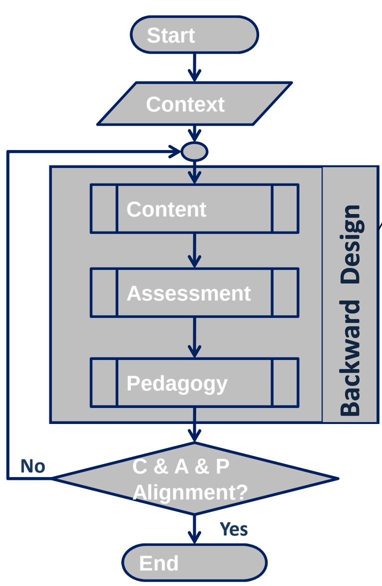
Content-Assessment-Pedagogy (CAP) Design Process Flowchart	Understanding by Design (Wiggins & McTighe, 2005)



Streveler, Smith & Pilotte (2011)

UdB – 3 Stages of Backward Design

Identify the Desired Results

Determine Acceptable Evidence

Plan Learning Experiences

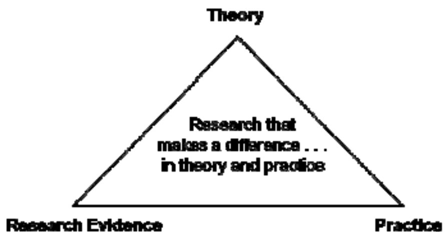
Are the desired results, assessments, and learning activities ALIGNED?

UbD Filters for Curricular Priorities

- Are the topics enduring and transferable big ideas having value beyond the classroom?
- Are the topics big ideas and core processes at the heart of the discipline?
- Are the topics abstract, counterintuitive, often misunderstood, or easily misunderstood ideas requiring coverage?
- Are the topics big ideas embedded in facts, skills and activities?

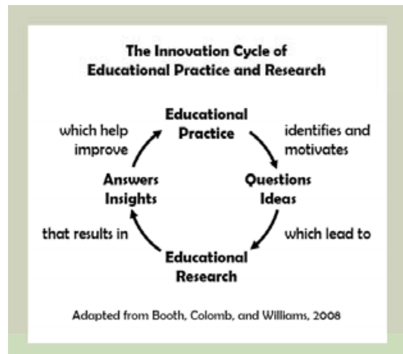
Understanding by Design, pp. 10-11

Discipline-Based Education Innovation



Discipline-Based Education Research

Streveler & Smith



Jamieson & Lohmann

Student Engagement Research Evidence

- Perhaps the strongest conclusion that can be made is the least surprising. Simply put, the greater the student's involvement or engagement in academic work or in the academic experience of college, the greater his or her level of knowledge acquisition and general cognitive development …(Pascarella and Terenzini, 2005).
- Active and collaborative instruction coupled with various means to encourage student engagement invariably lead to better student learning outcomes irrespective of academic discipline (Kuh et al., 2005, 2007).

See Smith, et.al, 2005 and Fairweather, 2008, Linking Evidence and Promising Practices in Science, Technology, Engineering, and Mathematics (STEM) Undergraduate Education - http://www7.nationalacademies.org/bose/Fairweather_CommissionedPaper.pdf

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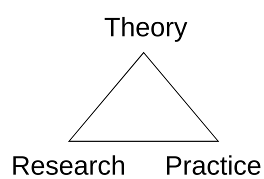
Pedagogies of Engagement

Cooperative Learning

- Theory – Social Interdependence – Lewin – Deutsch – Johnson & Johnson
- Research – Randomized Design Field Experiments
- Practice – Formal Teams/Professor’s Role



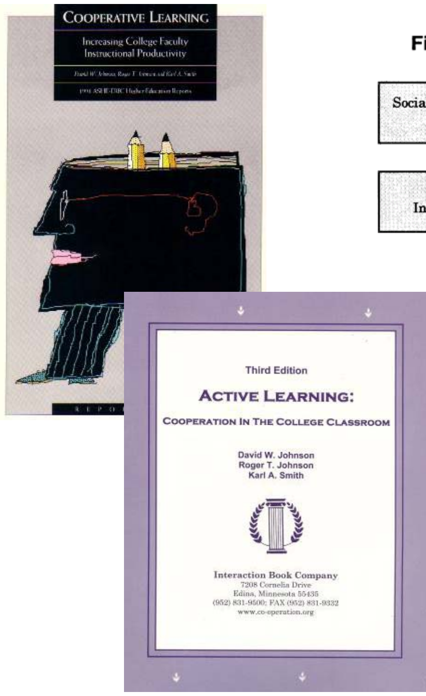
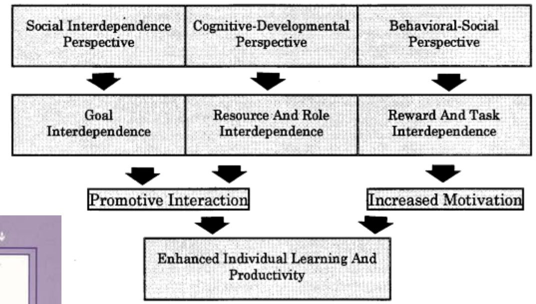


Figure A.1 A General Theoretical Framework



Cooperative Learning
- •Positive Interdependence
- •Individual and Group Accountability
- •Face-to-Face Promotive Interaction
- •Teamwork Skills
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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).

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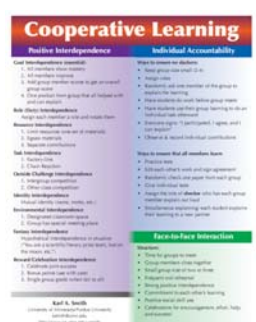
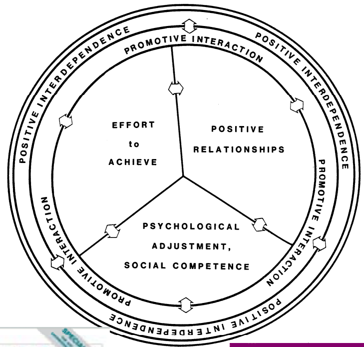


Cooperative Learning Research Support

Johnson, D.W., Johnson, R.T., & Smith, K.A. 1998. Cooperative learning returns to college: What evidence is there that it works? *Change*, *30* (4), 26-35.

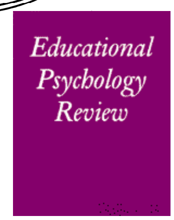
- Over 300 Experimental Studies
- First study conducted in 1924
- High Generalizability
- Multiple Outcomes



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

January 2005



March 2007

Active and Cooperative Learning

EDUCATION

Farewell, Lecture?

Eric Mazur

A physics professor describes his evolution from lecturing to dynamically engaging students during class and improving how they learn.

Discussions of education are generally predicated on the assumption that we know what education is. I hope to convince you otherwise by recounting some of my own experiences. When I started teaching introductory physics to undergraduates at Harvard University, I never asked myself how I would educate my students. I did what my teachers had done—I lectured. I thought that was how one learns. Look around anywhere in the world and you'll find lecture halls filled with students and, at the front, an instructor. This approach to education has not changed since before the Renaissance and the birth of scientific inquiry. Early in my career I received the first hints that something was wrong with teaching in this manner, but I had ignored it. Sometimes it's hard to face reality.

When I started teaching, I prepared lecture notes and then taught from them. Because my lectures deviated from the textbook, I provided students with copies of these lecture notes. The infuriating result was that on my end-of-semester evaluations—which were quite good otherwise—a number of students complained that I was "lecturing straight from (his) lecture notes." What was I supposed to do? Develop a set of lecture notes different from the ones I handed out? I decided to ignore the students' complaints.

A few years later, I discovered that the students were right. My lecturing was ineffective, despite the high evaluations. Early on in the physics curriculum—in week 2 of a typical introductory physics course—the Laws of Newton are presented. Every student in such a course can recite Newton's third law of motion, which states that the force of object A on object B in an interaction between two objects is equal in magnitude to the force of B on A—it sometimes is known as "action is reaction." One day, when the course had progressed to more complicated material, I decided to test my students' understanding of this concept not by doing traditional problems, but by asking them a set of basic conceptual questions (*1*, *2*). One of the questions, for example, requires students to compare the forces that a heavy truck and a light car exert on one another when they collide. I expected that the students would have no trouble tackling such questions, but much to my surprise, hardly a minute after the test began, one student asked, "How should I answer these questions? According to what you taught me or according to the way I usually think about these things?" To my dismay, students had great difficulty with the conceptual questions. That was when it began to dawn on me that something was amiss.

In hindsight, the reason for my students' poor performance is simple. The traditional approach to teaching reduces education to a transfer of information. Before the industrial revolution, when books were not yet mass commodities, the lecture method was the only way to transfer information from one generation to the next. However, education is so

Click here. Students continually discuss concepts among themselves and with the instructor during class. Discussions are spurred by multiple-choice conceptual questions that students answer using a clicker device. See supporting online text for examples of such "clicker questions."

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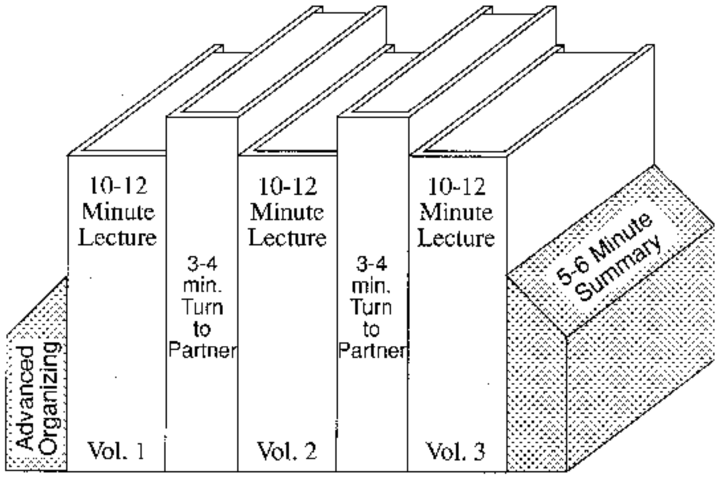
50 2 JANUARY 2009 VOL 323 SCIENCE www.sciencemag.org

January 2, 2009—Science, Vol. 323 – www.sciencemag.org

Calls for evidence-based promising practices

Book Ends on a Class Session



Smith, K.A. 2000. Going deeper: Formal small-group learning in large classes. Energizing large classes: From small groups to learning communities. *New Directions for Teaching and Learning*, 2000, 81, 25-46. [NDTL81Ch3GoingDeeper.pdf]

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Cooperative Learning

At M.I.T., Large Lectures Are Going the Way of the Blackboard

Josh Hilton for The New York Times

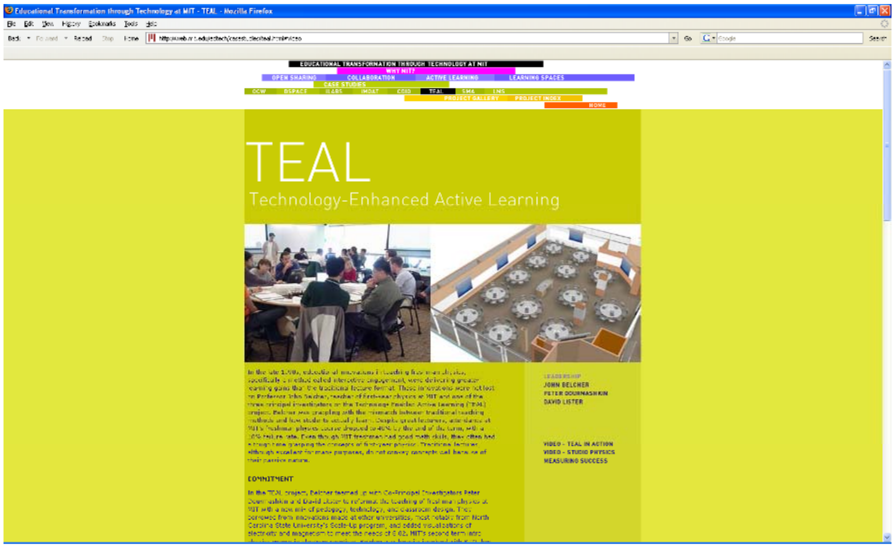
The Massachusetts Institute of Technology has changed the way it offers some introductory classes. Prof. Gabriella Sciolla at a class on electricity and magnetism.

By SARA RIMER
Published: January 12, 2009

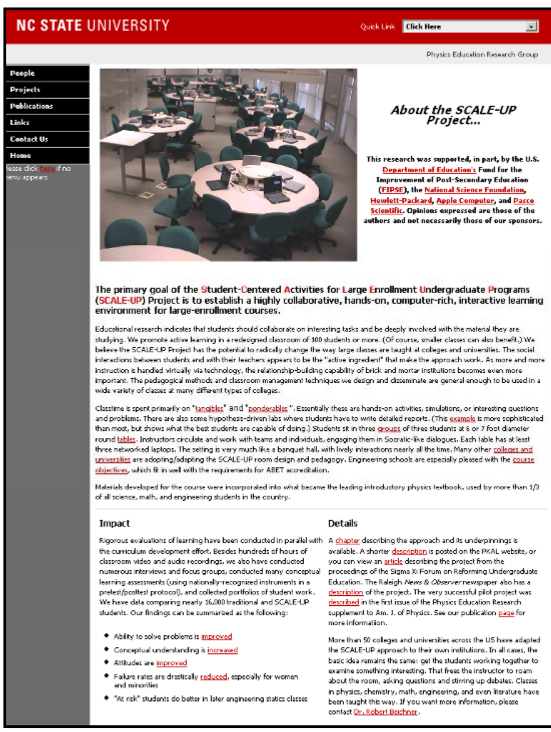
COMMENTS (60)
E-MAIL
PRINT
SINGLE PAGE

CAMBRIDGE, Mass. — For as long as anyone can remember, introductory physics at the Massachusetts Institute of Technology was taught in a vast windowless amphitheater known by its number,

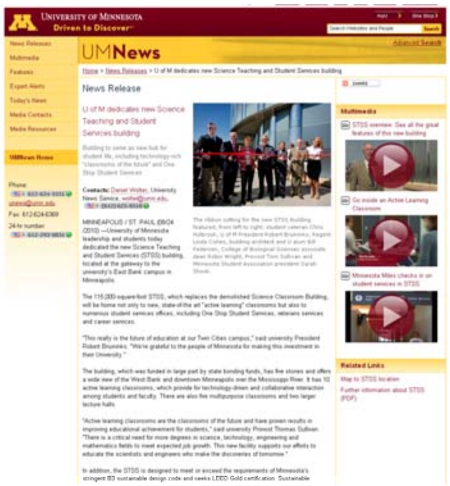
January 13, 2009—New York Times – http://www.nytimes.com/2009/01/13/us/13physics.html?em

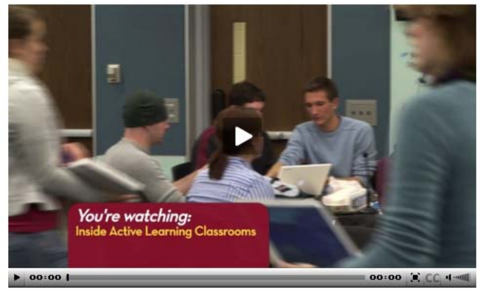


http://web.mit.edu/edtech/casestudies/teal.html#video



http://www.ncsu.edu/PER/scaleup.html





http://mediamill.cla.umn.edu/mediamill/embed/78755

http://www1.umn.edu/news/news-releases/2010/UR_CONTENT_248261.html

http://www.youtube.com/watch?v=lfT_hoiuY8w

http://youtu.be/lfT_hoiuY8w

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The American College Teacher:

National Norms for 2007-2008

Methods Used in “All” or “Most”	All – 2005	All – 2008	Assistant - 2008
Cooperative Learning	48	59	66
Group Projects	33	36	61
Grading on a curve	19	17	14
Term/research papers	35	44	47

http://www.heri.ucla.edu/index.php

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Cooperative Learning and Assessing Student Learning

1. Use a criterion-referenced system for all assessment and evaluation
2. Use a wide variety of assessment formats
   performance-based assessment
   authentic assessment
   total quality learning
3. Conduct assessment and evaluation in the context of learning teams
4. Directly involve students in assessing each other's level of learning
5. Assess, assess, assess, assess, and assess!

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Normal Distribution = Failure

It is not a symbol of rigor to have grades fall into a 'normal' distribution; rather, it is a symbol of failure – failure to teach well, to test well, and to have any influence at all of the intellectual lives of students – Milton, et al. 1986, p 225[1]

[1]Milton, O., Pollio, H.R., and Eison, J.A. 1986. *Making sense of college grades*. San Francisco: Jossey-Bass.

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Bloom's Distribution

If we are effective in our instruction, the distribution of achievement should be very different from the normal curve. In fact, we may even insist that our educational efforts have been unsuccessful to the extent that the distribution of achievement approximates the normal distribution. (p. 52)

Bloom, B. S., Madaus, G. F., and Hastings, J. T., Evaluation to improve learning. New York, NY: McGraw-Hill, 1981.

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Types of Assessment

1. Diagnostic Assessment
   Conducted at the beginning of an instructional unit, course, semester. . . to determine the present level of knowledge, skill, interest. . . of a student, group or class.
2. Formative Assessment
   Conducted periodically throughout the instructional unit. . .to monitor progress and provide feedback toward learning goals.
3. Summative Assessment
   Conducted at the end of an instructional unit or semester to judge the quality and quantity of student achievement and/or the success of the instructional unit.

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Assessment Formats

1. Performance-Based Assessment
   Students demonstrate what they know and can do by performing a procedure or skill
2. Authentic Assessment
   Students demonstrate a procedure of skill in "real life" context (See “approximations of practice”)
3. Total Quality Learning
   Continuous assessment of the process of learning (and teamwork) to improve it

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Making Assessments Meaningful

1. To be meaningful, assessment has to have a purpose that is significant
2. Assessments are meaningful when students are involved in conducting the assessment.
3. Meaningful assessments provide a direction and road map for future efforts to learn.

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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

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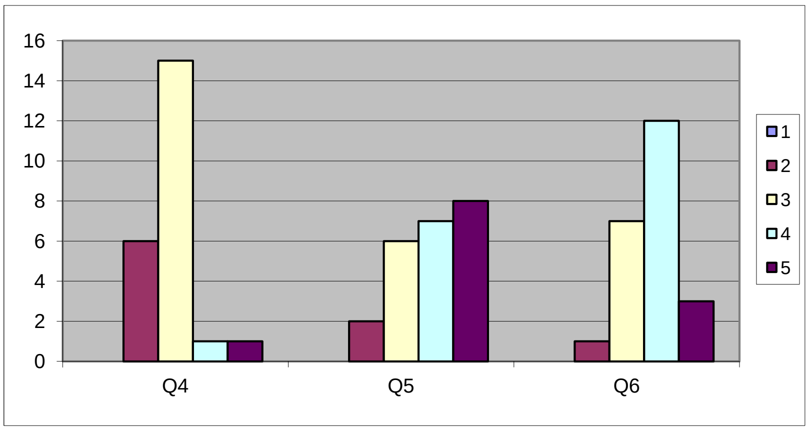
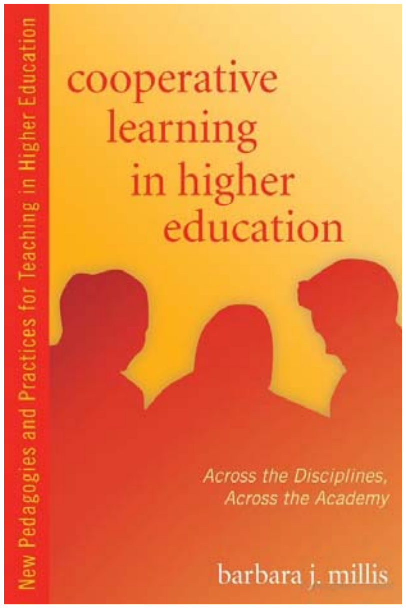
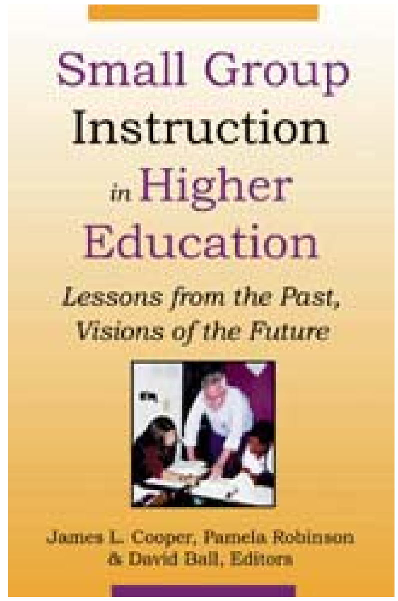
MOT 8221 – Spring 2011 – Session 1 (3/25/11)



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)





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Resources

- Design Framework – How People Learn (HPL) & Understanding by Design Process
  - Creating High Quality Learning Environments (Bransford, Vye & Bateman) -- http://www.nap.edu/openbook/0309082927/html/
  - Pellegrino – Rethinking and redesigning curriculum, instruction and assessment: What contemporary research and theory suggests. http://www.skillscommission.org/commissioned.htm
  - Smith, K. A., Douglas, T. C., & Cox, M. 2009. Supportive teaching and learning strategies in STEM education. In R. Baldwin, (Ed.). Improving the climate for undergraduate teaching in STEM fields. New Directions for Teaching and Learning, 117, 19-32. San Francisco: Jossey-Bass.
- Content Resources
  - Donald, Janet. 2002. Learning to think: Disciplinary perspectives. San Francisco: Jossey-Bass.
  - Middendorf, Joan and Pace, David. 2004. Decoding the Disciplines: A Model for Helping Students Learn Disciplinary Ways of Thinking. New Directions for Teaching and Learning, 98.
- 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
  - Smith (2010) Social nature of learning: From small groups to learning communities. New Directions for Teaching and Learning, 2010, 123, 11-22 [NDTL-123-2-Smith-Social_Basis_of_Learning-.pdf]
  - Smith, Sheppard, Johnson & Johnson (2005) Pedagogies of Engagement [Smith-Pedagogies_of_Engagement.pdf]
  - Cooperative learning returns to college: What evidence is there that it works? Change, 1998, 30 (4), 26-35. [CLReturnstoCollege.pdf]
- Other Resources
  - University of Delaware PBL web site – www.udel.edu/pbl
  - PKAL – Pedagogies of Engagement – http://www.pkal.org/activities/PedagogiesOfEngagementSummit.cfm
  - Fairweather (2008) Linking Evidence and Promising Practices in Science, Technology, Engineering, and Mathematics (STEM) Undergraduate Education - http://www7.nationalacademies.org/bose/Fairweather_CommissionedPaper.pdf

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