

**Achievement, Equity and Retention:**

*Key Pedagogical Changes that Can Make a Real Difference in ANY College Classroom  
[WITHOUT Lowering Standards]*

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**Overview:** When diversity issues are cast in content-centered ways, many faculty may view them as irrelevant to their own teaching. However, examination of pedagogical practices reveals a need for major changes in nearly all courses. We will examine at least three types of pedagogical changes that can make a real difference in achievement and retention in almost any college or university classroom. Specific topics will include: *How can I radically reduce or eliminate low grades in lecture courses without lowering standards? How can I make my students brighter and harder working using only 1 hour of class time (in ways that level the playing field for all groups)? And: Does my assessment system unfairly and unnecessarily favor particular groups?* Throughout we will ask what else we can do to increase achievement and fairness. **Processes today:** Mini-lectures alternating with writing and small- and whole-group discussions. **The focus will be on ideas that can be implemented in your own classes immediately.**

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*This is a **Default** Scope & Sequence. It is **NOT** a Promise! Indeed, we **cannot** do it all*

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**THREE OPENING CASES**

- Calculus--Highly Selective Institution--Blacks 60% D,F& W.  
Survey of entire faculty--How can this be? *How would faculty you work with explain?*
  
- Harvard—Your New Job: Work With Students Who Are In Academic Difficulty (Any subject).  
*What would the faculty you work with anticipate to be the student’s problems?*
  
- Your Department or Program: *Faculty’s ideas of main reasons that students don’t succeed?*

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**PART 1: QUICK WAYS TO MAKE *BIG* DIFFERENCES**

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**HOW CAN I RADICALLY REDUCE OR ELIMINATE LOW GRADES IN LECTURE COURSES *WITHOUT* LOWERING STANDARDS?**

*[Framework: Structured Active Learning]*

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**Example 1: Uri Treisman, Calculus & Minorities**

Extended By Others to Rural Whites Etc.

**Core Problems:** Elite v Non-College Prep. High School Programs => Few Serious Peers; Achievement Low Social Value; Penalize Peer-Checking, Don't Study Together (Effectively)

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***Two (or more) important take home points? 1 or 2 Questions?***

- Treisman, [P.] U. 1992. Studying Students Studying Calculus: A Look at the Lives of Minority Mathematics Students in College. *College Mathematics Journal* 23: 362-372. <http://math.sfsu.edu/hsu/workshops/treisman.html>
- Fullilove, R. E. and P. U. Treisman. 1990. Mathematics Achievement Among African American Undergraduates at the University of California, Berkeley: An Evaluation of the Mathematics Workshop Program. *Journal of Negro Education* 59(3): 463-478.
- Treisman's Model: <http://www.math.uiuc.edu/MeritWorkshop/uriModel.html>
- Math Education Database, Workshop Calculus Problems, Workshop TA Handbook: <http://betterfilecabinet.com/>
- Merit Workshop, U. IL. <http://www.math.uiuc.edu/MeritWorkshop/merit-introduction.html>
- Project Excel, Northeastern U., [http://www.math.neu.edu/WWW\\_math/Undergrad/excel.html](http://www.math.neu.edu/WWW_math/Undergrad/excel.html)
- Math Excel, U. Ky: <http://www.ms.uky.edu/~freeman/mathexcel.html>

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**Example 2: Calculus Without F's**

• Angelo, T. A. and K. P. Cross. 1993. Example 4. pp. 69-72 in *Classroom Assessment Techniques*. 2nd edit. Jossey Bass. "for the first time in nearly 30 years of...calculus he did not fail single student"

**Example 3: Economics Without F's**

• Nelson, C.E. 1996. Student Diversity Requires Different Approaches to College Teaching, Even in Math and Science. *American Behavioral Scientist* 40:165-175. [Ideas apply across the curriculum.] [http://mypage.iu.edu/~nelson1/96\\_StudentDiversity.pdf](http://mypage.iu.edu/~nelson1/96_StudentDiversity.pdf)

**Example 4: Low Math SAT & Chemistry**

• Jacobs, D.C. 2000/Web. *An alternative approach to general chemistry: Addressing the needs of at-risk students with cooperative learning strategies.* <http://gallery.carnegiefoundation.org/djacobs/index2.htm> At risk = low math SAT: 50% fewer made D/F in general chemistry, twice as many made A or B. *Retention of at-risk students increased 50% in subsequent organic chemistry and sophomore biology courses and 50% more majored in science.*

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***Two (or more) important take home points? 1 or 2 Questions?*** [Implementation is next.]

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**Three Dysfunctional Illusions of Rigor**

*Note: I am only citing illusions in this workshop that I once shared enthusiastically.*

**1. Hard courses weed out weak students:** When students fail it is primarily due to inability, weak preparation or lack of effort. [v. It is most often due to ineffective pedagogy.]

**2. Massive grade inflation is a corruption of standards.**  
[v. What we need is a lot more of the right kind of grade inflation.]

**3. Traditional methods of instruction are fair to a wide range of diverse students of good ability.** [v. Designed for and favor rich white males from great college prep programs]

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***IMPLEMENTATION IN YOUR CLASSES—THE THREE BASICS***

**1. Preparation: Need Essentially ALL Students Prepared.**

General Knowledge, In-Class Reading or Lecture, Worksheet, Quiz...

*Worksheets & Red Pens*

*Make it Count ENOUGH in grade*

**2. Cognitive Focus: On Same Topic and Important Focus**

EXPERT Question or Worksheet ... [NOT “Any Questions?”] [S-S discussion; NOT T-S OR S-T Recitation]

**3. Social System (Groups & Roles). Every Student Participating Constructively**

Write-Pair-Share For Short Times.

*Two-Minutes & Social Roles ...*

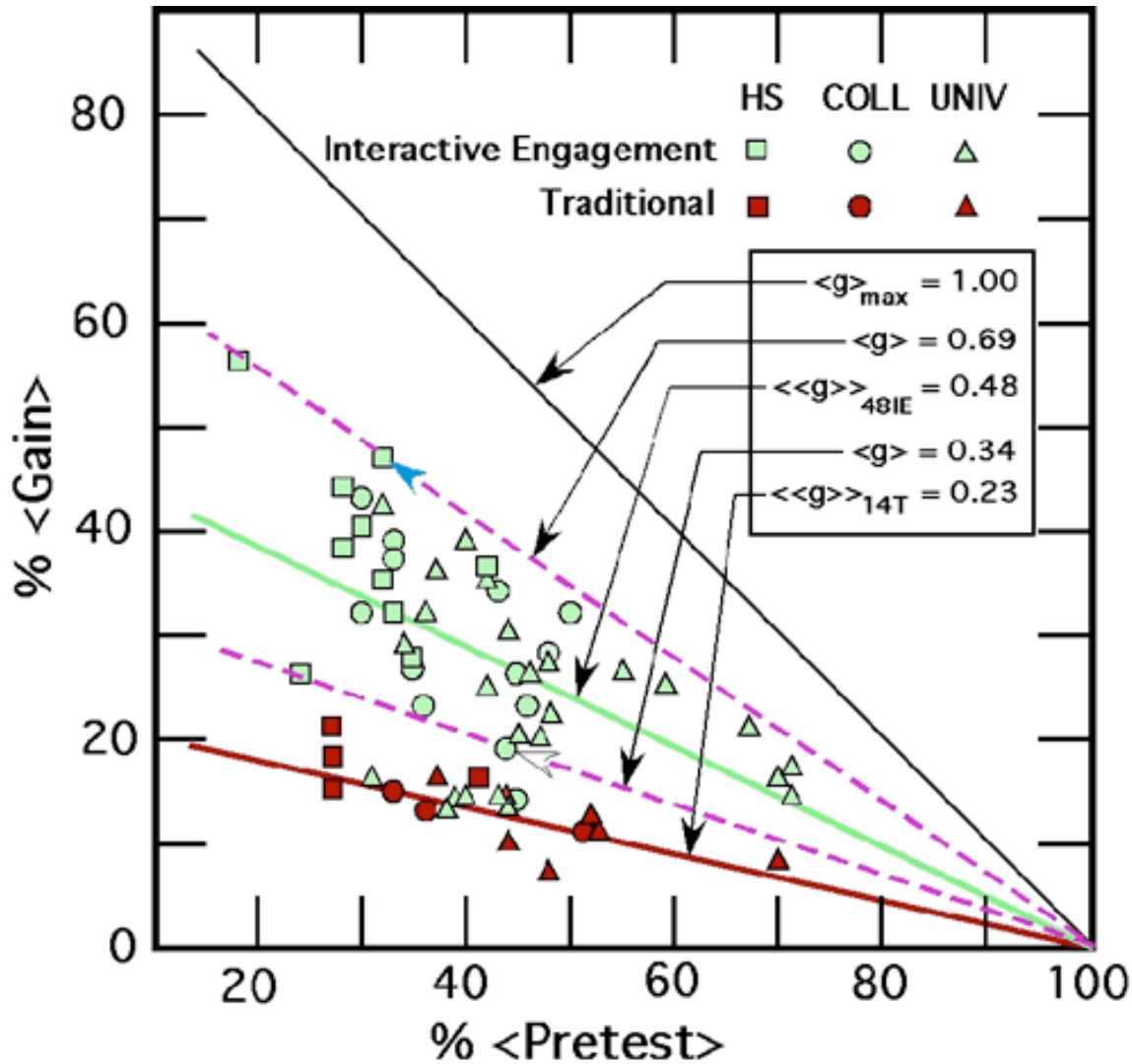
Teacher Formed Groups of 5-6 for Longer Discussions

*Group Responsible For All Participating*

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**Example 5: Pedagogies Compared Broadly: Physics**

Pre & Post Tests; Qualitative MC Questions; Misconception based (Start w Fill in blank)



**Y AXIS: HOW MUCH THEY ADVANCED:**  $\%<GAIN> = \%<POSTTEST> - \%<PRETEST>$

**LINES: PROPORTION OF IGNORANCE CURED:** % OF MAXIMUM POSSIBLE GAIN  
 $= (\%<POSTTEST> - \%<PRETEST>) / (100 - \%<PRETEST>)$

**THIS IS A TOUGH MEASURE OF THE EFFECTIVENESS OF TEACHING—ONLY GET CREDIT FOR NET GAINS**

• Hake, R. R. 2002. Lessons From the Physics-Education-Reform Effort. *Ecology and Society* 5(2):28 [online] <http://www.ecologyandsociety.org/vol5/iss2/art28/> [More details: Hake 1998. Interactive-engagement vs traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics* 66: 64-74 <http://www.physics.indiana.edu/~sdi/ajpv3i.pdf>.]

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**Two (or more) important take home points from Hake? 1 or 2 Questions?**

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### **Example: Mazur's Peer Instruction [lectures with carefully structured discussion]**

- Mazur, E.. Harvard. Physics. Education Research Page. Peer Instruction [=PI] and related topics. <http://mazur-www.harvard.edu/education/educationmenu.php>
- Crouch, Catherine H. and E. Mazur. 2001. Peer Instruction: Ten Years of Experience and Results *Am. J. Phys.*, 69, 970-977. At: <http://mazur-www.harvard.edu/education/educationmenu.php>
- Crouch, Catherine H., A. P. Fagen, P. Callan and E. Mazur. 2004. Classroom Demonstrations: Learning Tools or Entertainment? *Am. J. Phys.*, 72, 835-838. [*Straight demos no effect. Add prediction and interaction.*]

### **Example: Biologists lecturing do worse than physicists**

- Sundberg, Marshall D. 2003. Strategies to Help Students Change Naive Alternative Conceptions about Evolution and Natural Selection. *Reports of the National Center for Science Education* 23(2) <http://www.ncseweb.org/newsletter.asp?curiss=38>

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## **GREAT STARTING SITES FOR INTERACTIVE ENGAGEMENT**

*Who has worked with these?*

**Collaborative Learning.** National Institute for Science Education, University of Wisconsin Madison. <http://www.wcer.wisc.edu/archive/CL1/CL/default.asp> Includes: 1. Doing CL, 2. Tough Questions [on CL], 3. James Cooper & Pamela Robinson. 1998. *Small-group Instruction in Science, Mathematics, Engineering and Technology (SMET) Disciplines: A Status Report and an Agenda for the Future*. 4. J. Cooper & P. Robinson. 1997. Small-group instruction: An annotated bibliography of science, mathematics, engineering and technology resources in higher education.

**Team Based Learning.** <http://atlas.services.ou.edu/idp/teamlearning/index.htm> See Also: Michaelsen, L. K., A. B. Knight and L. D. Fink. Eds. 2004. *Team-Based Learning: A Transformative Use of Small Groups in College Teaching*. Stylus.

**Problem-based Learning**, especially in large classes. <http://chemeng.mcmaster.ca/pbl/pbl.htm> **Problem Based Learning Clearing House.** University of Delaware. <https://chico.nss.udel.edu/Pbl/> See also list of sites: <http://www.udel.edu/pbl/others.html>

**Process Oriented Guided Inquiry Learning (POGIL).** A POGIL classroom or lab consists of any number of students working in small groups on specially designed guided inquiry materials. These materials supply students with data or information followed by leading questions designed to guide them toward formulation of their own valid conclusions - essentially a recapitulation of the scientific method. The instructor serves as facilitator, observing and periodically addressing individual and classroom-wide needs. *POGIL is based on research indicating that a) teaching by telling does not work for most students, b) students who are part of an interactive community are more likely to be successful, and c) knowledge is personal; students enjoy themselves more and develop greater ownership over the material when they are given an opportunity to construct their own understanding.* <http://www.pogil.org/info/introduction.php>

**National Center for Case Study Teaching in Science.** SUNY-Buffalo (Clyde Herreid) [How to and many cases.] <http://ublib.buffalo.edu/libraries/projects/cases/case.html> Don't miss the links to other case studies sites: <http://ublib.buffalo.edu/libraries/projects/cases/webcase.htm> See Also: Herreid, C. F. 2004. Using case studies in science—And still “covering the content.” pp 105-114 In Michaelsen, L. K., et al. Eds. 2004. *Team-Based Learning*. Stylus.

**Just-in-Time-Teaching.** “JiTT is a teaching and learning strategy based on the interaction between web-based study assignments and an active learner classroom. Students respond electronically to carefully constructed web-based assignments which are due shortly before class, and the instructor reads the student submissions “just-in-time” to adjust the classroom lesson to suit the students' needs.... we are aware of approximately 300 faculty in 25 disciplines at approximately 100 institutions ... who have adopted the JiTT strategy.” <http://webphysics.iupui.edu/jitt/jitt.html>

**Project Kaleidoscope.** *Pedagogies.* Overview of 12 active-learning pedagogies, focused on science but broadly useful. <http://www.pkal.org/keywords/Pedagogies.cfm>

**Good Sources of Proven Techniques [Books]:** [1] Elizabeth Barkley, K. Patricia Cross, Claire Howell Major. 2004. *Collaborative Learning Techniques: A Handbook for College Faculty*. Jossey-Bass. [2] Charles C. Bonwell and James A. Eison. 1991. *Active Learning: Creating Excitement in the Classroom*. ASHE-ERIC Higher Education Report. [3] Barbara J. Millis and Philip G. Cottell. 1997. *Cooperative Learning For Higher Education Faculty*. American Council on Education/ Oryx Press.

• Smith, Karl A, Sherri D Sheppard, David W Johnson, Roger T Johnson 2005. Pedagogies of Engagement: Classroom-Based Practices. *Journal of Engineering Education*.2005: 87-101. **GREAT REVIEW**  
[http://www.asee.org/about/publications/jee/upload/SamplePages\\_87-101.pdf](http://www.asee.org/about/publications/jee/upload/SamplePages_87-101.pdf)

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### **A NOTE OF CAUTION: GET A SMOOTHER START IN FOSTERING LEARNING**

**Caveat: Patience Helps.** “Karl Smith of University of Minnesota and Barbara Millis, soon to be of University of Nevada at Reno, are both authors of excellent books on *cooperative learning* ("*interactive engagement*") and both are refreshingly honest in their workshops about the *deleterious effects of such methods on student evaluations if one plunges in too quickly or is in the initial awkward stages of learning a new pedagogy by doing*.... I concur that if one MUST choose between student learning and student satisfaction, the learning has to come first. But, I have never seen an actual case yet in which that is THE choice that must ultimately be made over the long haul.... Granted, active learning done for the first time is awkward--but so is lecturing---and if one works to get proficiency in getting both learning and satisfaction, one can eventually prevail in both areas. If one is at the "one or the other" thinking, then one is stuck at being satisfied with half-success. It is borderline insanity not to continue to seek ways in which both learning and satisfaction can be retained. To choose otherwise is to give into going into classroom after classroom--spending one's life with "unhappy campers" (adults who are not satisfied or enthused about learning a topic or being in the room with me). Who wants that kind of professional life? Likewise, if one enjoys popularity, it's dangerous to smugly presume "I'm very popular; therefore I'm a great teacher." A really great teacher will be unafraid to put the results to the test in some type of learning assessment. Results of that can be just as callous a wake-up call as low student evaluation marks.” *Ed Nuhfer* POD 4 May 2004

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### **Ways to Minimize**

Avoid Re-Inventing Square Wheels: Start with established methods and deviate with caution.

Be sure to explain WHY you are teaching in atypical ways (increase learning and grades, etc.)

Point out that grades are indeed better (assuming they are)

Mid-Semester feedback and re-explanation

*Applications in your classes? Comments or Questions?*

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**HOW CAN I MAKE MY STUDENTS BRIGHTER AND HARDER WORKING  
USING ONLY 1 CLASS HOUR?**

**AND SIMULTANEOUSLY LEVEL THE PLAYING FIELD FOR ALL GROUPS?**

*[Framework: Teach Basic Disciplinary Skills]*

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**Example 1:** Essay Exam Question Criteria

(Mitzi Streepey in Nelson 1996)

***Why Works?***

**1. Disciplinary Discourse in College Prep. v Regular Secondary Schools**

• Rose, M. 1989. *Lives On The Boundary: A Moving Account Of The Struggles And Achievements of America's Underclass*. Penguin Books. Chapters 7 & 8 are **Essential**.

**2. Writing Across the Curriculum: Diverse Examples--*NOT just "A" Papers;***

**3. ACTIVE LEARNING OF HOW TO MEET EXPECTATIONS** [NOT just explained]

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**More Examples: Not Just Essays Exams .....**

Multiple Choice Questions, Introductory Courses (& GRE)

Reading Same Book in Different Courses? Thus ...

CEN & Freshman Writing: Co-valedictorian ...

Papers & Rubrics *Rubrics, Criteria, etc. must be taught comparatively, not just explained*  
*Use one of these in designing or revising student evaluation and grading: [1] Barbara E. F. Walvoord, and Virginia J. Anderson. 1998. Effective Grading: A Tool For Learning And Assessment. Jossey-Bass. OR [2] Dannelle D. Stevens, Antonia J. Levi. 2004. Introduction To Rubrics: An Assessment Tool To Save Grading Time, Convey Effective Feedback and Promote Student Learning. Stylus.*

**IMPLEMENTATION IN YOUR CLASSES?**

*Three Tasks to Your Students Need To Do Well to Succeed?*

*[ = In What Ways Do Your Students Need To Use Disciplinary Skills?]*

*How Do/Can You Provide Practice (Or Check That They Already Have Mastered?)*

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## ANOTHER DYSFUNCTIONAL ILLUSION

**4. Students should come to us knowing how to read and write and do essay and multiple choice questions.! [v. High school is MUCH simpler. AND: Each discipline has its own conventions. Only great preparatory programs (multiple AP courses) teach these.]**

- K. A. Bruffee. 1984. Collaborative learning and the “conversation of mankind.” *College English*, 46:635-652.
- K. A. Bruffee. 1998. *Collaborative Learning: Higher Education, Interdependence, and the Authority of Knowledge*. 2nd Edition, Johns Hopkins.

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### ***COROLLARY: STUDENT ERRORS ARE OFTEN MISLEADING***

#### ***Thinking Hard Increases Mechanical Errors***

Faculty often address mechanical and fundamental thinking errors equally

When master intellectual tasks, many mechanical errors vanish

=> Patience; Writing as Process (Require preliminary draft etc)

- G. Colomb. 1986. *Disciplinary Secrets And The Apprentice Writer*. Institute for Critical Thinking, Montclair State College.

***Students misread expectations.*** [e.g. Think have to abandon simple statements.]

- Mike Rose. 1989. *Lives On The Boundary: A Moving Account of the Struggles and Achievements of America's Underclass*. Penguin Books. [Chs 7 & 8 **Essential**]

***Intelligence of Student Errors*** [Parallels Misconceptions (below)]

- Shaughnessy, M. 1977. *Errors and Expectations*. Oxford University Press.

***Misunderstandings & Misconceptions: Too many for faculty member to catch and address***

Didn't Fully Understand Presentation, Reading etc. OR Misunderstood Metaphor

***Misconceptions: Too many for faculty member to catch and address***

Common, Idiosyncratic &/Or Taught. Ex: Commas after trees

=> Remember Mazur: 50% reduction of errors in 2 minutes of *structured* S-S work

- Duit, Reinders. 2007. Bibliography – STCSE: Students' and teachers' conceptions and science education. Online [www.ipn.uni-kiel.de/aktuell/stcse/stcse.html](http://www.ipn.uni-kiel.de/aktuell/stcse/stcse.html) [Cites 7,700 studies and reviews].

***Two (or more) important take home points? 1 or 2 Questions?***



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## REVIEW+: WHY DO ACTIVE LEARNING & DISCIPLINARY SKILLS MATTER?

*Why are these approaches so much more effective than traditional teaching? Understanding why they work makes it easier to refine how we use them.*

**Problem 1.** *Elite v Non-College Prep. High School Programs* => Few Serious Peers;  
Achievement Low Social Value; Penalize Peer-Checking, Don't Study Together (Effectively)  
(Above: Treisman)

**Problem 2.** *Disciplinary Discourse in Intensely College Prep. v Regular Secondary Schools*  
Students expect plain English; Faculty have forgotten it. (Above: Brufee)

**Problem 3.** *Just Show Them an "A" Paper/Answer Illusion.* [Underestimates difficulty of P #2.]  
*Writing Across the Curriculum:* Diverse Examples; Explicit Criteria

**Problem 4:** *Misconceptions*

**Problem 5.** *Expert v Novice Address to Difficulties*  
Peer-Led Discussions in Psychology: Direct Answer v Elaboration (Not Published)

**Problem 6.** *Fundamentals of Learning*  
Example: Information Processing (Limited Working Memory): **Guppy Effect.**

- Commission on Behavioral and Social Sciences and Education (CBASSE). 2000. ***How People Learn: Brain, Mind, Experience, and School: Expanded Edition.*** National Academy Press. Read online and print free or buy at <http://fermat.nap.edu/books/0309070368/html/> [REPLACED: Bransford, J. D., Brown, A. L. & Cocking, R. R., Editors. 1999. *How People Learn: Brain, Mind, Experience, and School.*]

- M. Suzanne Donovan and John D. Bransford, editors. 2005. [Three titles:] [1] ***How Students Learn: Mathematics in the Classroom.*** [2] ***How Students Learn: Science in the Classroom.*** [3] ***How Students Learn: History in the Classroom.*** Committee on How People Learn: A Targeted Report for Teachers. National Research Council. National Academy Press [“... how the principles of learning can be applied in science [or math or history] at three levels: *elementary, middle, and high school.* Leading educators explain in detail how they developed successful curricula and teaching approaches...”] Read online and print free or buy at <http://www.nap.edu/catalog/10126.html>

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***What three further changes in your teaching do these frameworks suggest? Questions?***

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## PART 2: FOCUSING ON UNDERPOWERED STUDENTS

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### DO I PROJECT LOW EXPECTATIONS OR ONES THAT DIFFER BY GROUP?

*[Framework: Stereotype Threat]*

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#### **Stereotype Threat:**

Women and Men on Math When “Diagnostic of Group Differences”

African Americans and White Americans

White Men too

#### **General strategy:**

Expect that all can do it—*it is only college*

Say: High Expectations but know you can do it.

1 on 1: Cite evidence that shows can do good work

Teach so they can indeed largely all get it.

#### **Example: Equations and graphs in biology**

I know many of you have found these approaches distasteful

Are important because ...

Going to learn in a way where every one will understand

#### **Implementation in your classes? Examples or comments or questions?**

• Steele, C. M. 1999. Thin Ice: 'Stereotype Threat' and Black College Students. *Atlantic Monthly* Aug. 1999: 44-54. <http://www.theatlantic.com/issues/99aug/9908stereotype.htm> [subscribers]

[http://www2.newton.mec.edu/~gary\\_shiffman/Thin%20Ice](http://www2.newton.mec.edu/~gary_shiffman/Thin%20Ice)

• Steele, C. M. 1997. A Threat In The Air: How Stereotypes Shape Intellectual Identity And Performance. *American Psychologist* 52:613-629.

• Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African-Americans. *Journal of Personality and Social Psychology*, 69, 797-811.

• Aronson, J., Lustina, M., Keough, K., Brown, J. L., & Steele, C. M. (1999). **When White men can't do math:** Necessary and sufficient factors in stereotype threat. *Journal of Experimental Social Psychology*, 35, 29-46. (For An Application Showing That Whites Can Experience Stereotype Threat)

• Cohen, G. L. and C. M. Steele. 2002. A Barrier of Mistrust: How Negative Stereotypes Affect Cross-Race **Mentoring**. Pp 303-327 in *Improving Academic Achievement*. Elsevier.

• Cohen, G., Steele, C. M., & Ross, L. D. (1999). The **mentor's dilemma**: Providing critical feedback across the racial divide. *Personality and Social Psychology Bulletin*, 25, 1302-1318.

<http://psp.sagepub.com/cgi/reprint/25/10/1302.pdf> [\$25]

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**DOES MY GRADING UNFAIRLY AND UNNECESSARILY FAVOR PARTICULAR GROUPS?** [*Framework: Tacit Bias in Assessments*]

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**Example 1:** When Give Exam Only Once Implicitly Assume:

- a. Student Knows When She Has Achieved "A" Level Mastery
- b. She Knows This so Well That She Allocates Enough Time
- c. She Has Control Over Her Time & Can Make That Allocation Stick  
(v Has Real Job or Is Single Parent With Sick Kids)
- d. Believes the Instructor Wants & Expects Her to Succeed (v “Stereotype Threat--Steele)

**Response:** Two Exams.... [*v Grading Effort; v “Coverage”*]

**Example 2:** Totally Fixed Deadlines For Papers, Lab Reports, Etc.

**Responses:** Revisable Papers &/Or Set Number Of Late Days

**Comment:** But... Professionals Need To *Manage Time?*

Require Of Frosh v Elicit By End? Options ALLOW time-Management!!

*Implementation in YOUR Classes?*

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**ANOTHER DYSFUNCTIONAL ILLUSION**

**5. It is essential that students hand in papers on time and take exams on time. Giving them flexibility and second chances is pampering them.** [v. Give *limited* time flexibility and a *limited* number of repeats on exams as a way of fostering increased achievement.]

• C. E. Nelson. 1996. Student Diversity Requires Different Approaches to College Teaching, Even in Math and Science. *American Behavioral Scientist*. 40(2):165-175.

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## SYNERGY: STRUCTURED GROUPS & “MAPS”

### ***Intensive Freshman Seminar:***

*What can I do that will maximize achievement over four years?  
Affiliation, Power of Groups, Basic Skills, Excitement, Maps.*

### ***Three Maps from Nelson's Intensive Frosh Seminar:***

#### ***Map 1: Me-Now, Me-Then***

- *Step 1. [Before Coming to IU] How Will College Help Me Earn More Money?  
What Else Do I Want To Achieve There--Intellectually & Personally?*
- *Step 2. [Before Coming To IU] Compare Answers With Those Of 4 Adults.*
- *Step 3. [At IU] Examine Notes From Seniors: What I Wish I Had Known!*
- *Step 4. [At IU] What Are My Goals For Next 4 Years?  
What Two Specific Steps Can I Take In First Week To Move Toward Each Goal?*

#### ***Map 2: Thinking Modes***

***[Perry]***

- *Step 1: What Kinds Of Answers Do I Expect? What Other Kinds Are There?*
- *Step 2: How Do Scientists Decide Which Answers Are Better? [“ways of knowing”]*
- *Step 3: How Will I Decide Which Answers Are Better?*

#### ***Map 3: Objectivism To Constructivism Gradient***

- *Anderson, W.T. 1990. Reality Isn't What It Used To Be: Theatrical Politics, Ready-to-Wear Religion, Global Myths, Primitive Chic, and Other Wonders of the Postmodern World. Harper & Row.*
- *Step 1: How Does This Gradient Work?*
- *Step 2: Where Does The Author/Teacher Place This Topic On Gradient?  
Where Do I Think It Should Be Placed?*

### ***Group Process from Nelson's Intensive Frosh Seminar:***

- **Goals:** 1. Increased conceptual mastery. 2. Learn the value of groups
- **Set-Up:**
  - √ Text difficult enough that group work will help. [Anderson: Reality Isn't ....]
  - √ Instructor assigned groups of 4-5. Reshuffled occasionally.
  - √ Question sheets over reading given out with assignment
  - √ In-class practice: Write and compare answers on initial assignments
  - √ Initial quizzes are practice only
- **Three In-Class Grades.**
  1. Each student assigned to write different question from assignment sheet.
  2. Average of individual grades for members of own group  
BUT all grades of at least 8/10 raised by 1/10 before averaging [B => A]
  3. Group revises each answer as needed using red pens--all communications written and initialed. [Immediate feedback. Most marking usually done for me by them]  
3rd grade is average of revised grades.
- **Assessment:**
  - √ With group assisted learning, almost every student mastered most questions to at least the B level (after initial 2 or 3 practice quizzes).
  - √ Group dynamics: Active group work every afternoon or night  
Best bonded IFS group 1st week [but also used challenge ed]

***What frameworks/processes can you teach in the 1st yr that will maximize 2 and 4-yr success?***

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## A FINAL DYSFUNCTIONAL ILLUSION

### 6. If we cover more content, the students will learn more. v. Less is usually more.

**Problem:** Always more than we can cover. [And I love it all!]

**Problem:** Increased coverage does not increase learning.

Too much content makes us think we don't have time for effective teaching.

Too much content poisons student attitudes [*Thinking about Leaving*]

**Solutions:**

Biology students learn more in non-majors courses.

Physics 130 equations to 30

Designate several periods as “spare” on the syllabus

Design a course for one-half of available time—forces prioritization.

Highlight text with exam ready study questions instead of with lectures.

• M. D. Sundberg & M. L. Dini. 1993. Science majors vs nonmajors: Is there a difference? *Journal of College Science Teaching*. Mar/Apr 1993:299-304. [Multiple sections and instructors. Both courses taught with traditional pedagogy, but with different intensities of 'coverage.' "The most surprising, in fact shocking, result of our study was that the majors completing their course did not perform significantly better than the corresponding cohort of nonmajors." ]

• Sundberg, M.D., M.L. Dini and E. Li. 1994. Improving student comprehension and attitudes in freshman biology by decreasing course content. *Jour. Res. Sci. Teach.* 31: 679-693.

• J Russell, W. D.Hendricson & R. J. Herbert. 1984. "Effects of lecture information density on medical student achievement." *Journal of Medical Education* 59:881-889. [Three different lectures on the same subject. 90% of the sentences in the high-density lecture disseminated new information as did 70% in the medium and 50% in the low. Remaining time used for restating, highlighting significance, more examples, and relating the material to the student's prior experience. Students randomly distributed into the 3 groups (no significant differences in prior GPA or on knowledge base pretest). Students in low treatment learned and retained lecture information better.] [Here less is more.] [from C.C. Bonwell]

• Nelson, C.E. 2001. "What Is The Most Difficult Step We Must Take To Become Great Teachers?" *National Teaching and Learning Forum* [= *NTLF*]. 10(4): 10-11. [http://mypage.iu.edu/~nelson1/01\\_6\\_MostDifficult.pdf](http://mypage.iu.edu/~nelson1/01_6_MostDifficult.pdf)

***WHAT DO YOU DO OR COULD YOU DO TO LIMIT CONTENT ENOUGH TO ALLOW EFFECTIVE LEARNING?***

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**PERSPECTIVE: Scholarship of Teaching and Learning [SOTL]**

**Traditional Teaching.**

**Scholarly Teaching:**

Basic mastery and application of general literature on college/university teaching.  
Compares own practices with “best practices” for similar courses elsewhere.

**Scholarship of Teaching and Learning [SOTL]**

Recognize and care about problem: It ain’t working good enough  
Doing the same harder doesn’t work either  
[Better ways are not obvious from the literature]  
Qualitative explorations of what is happening  
Qualitatively new attempts to make it work  
Quantitative [and Qualitative] assessment of effects  
Make it Public

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***Some Conclusions and Questions***

**Conclusions:**

1. Traditional, didactic, ways of teaching and grading are comparatively ineffective.
2. Traditional, didactic, ways of teaching and grading are tacitly biased against students from underpowered backgrounds. [Tacit or unintentional racism, classism, etc.]
3. There is very extensive support for the first two conclusions.
4. Students clearly recognize that traditional, didactic teaching is unsatisfactory.  
Seymour, E. and N. M. Hewitt. 1997. *Talking About Leaving: Why Undergraduates Leave the Sciences*. Westview.
5. Faculty and students both resist change. Faculty through Dysfunctional Illusions of Rigor

***The two most important questions in higher education may be:***

1. Why do faculty insist on teaching in ways that are widely recognized to be ineffcient?
2. Why do administrators allow—even encourage—inefficient teaching?

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**FUNDAMENTAL CHOICE: *Sorting Students v Maximizing Achievement?***  
[i.e. Maximizing Number That Master At "A" Without Lowering Standards]

**Underlying Questions:**

- 1. *Measure Teaching By What Teacher Says Or By What The Students Learn?***
- 2. *Maintain Dysfunctional Illusions of Rigor v Foster Maximal Student Success?***
- 3. *Social Function of Higher Education? Equalizer? OR: Leaky Preserver of Privilege?***

- Samuel Bowles, & J. Gintis. 1973. I.Q. In the United States Class Structure. *Social Policy* 3:4-5.
- Samuel Bowles. 1977. *Schooling in Capitalist America: Educational Reform and the Contradictions of Economic Life*. New Edition. Basic Books

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**SYNTHESIS**

- **Perry: Eventually, Students Here Have Just One Question: "Are you OK?"**

*How Does The Content You Choose To Teach And That You Choose NOT To Teach Reflect Your Own Personal Values, What You Stand For As A Morally Significant Human Being?*

*How Do The Pedagogies You Choose To Use And Those You Choose NOT To Use Reflect Your Own Personal Values, What You Stand For As A Morally Significant Human Being?*

## **SELECTED ADDITIONAL RESOURCES**

### **TEACHING BASICS**

**Three Good Teaching Overviews—Pick One:** Wilbert James McKeachie and Marilla Svinicki. 2005. *McKeachie's Teaching Tips: Strategies, Research And Theory for College And University Teachers*. 12th Edition. **OR:** Linda B. Nilson, 2003. *Teaching at Its Best: A Research-Based Resource for College Instructors*. Anker. **OR:** Maryellen Weimer. 2002. *Learner-Centered Teaching: Five Key Changes to Practice*. Jossey-Bass.

**Great First Downloads: IDEA Papers.** Topics include *Improving Lectures, Improving Discussions, Improving Essay Tests, Improving Student Writing, Improving Grading, Evaluating Teaching and many more*. 4-8 pages each, feature both techniques and introduction to literature. Free PDFs <http://www.idea.ksu.edu/resources/Papers.html>  
Also archives of **Tomorrow's Professor Listserve** <http://sll.stanford.edu/projects/tomprof/newtomprof/postings.html>

**Use one of these in Designing or Revising a Course:** [1] John Bean. 1996. *Engaging Ideas: The professor's Guide to Integrating Writing, Critical Thinking, and Active learning in the Classroom*. Jossey-Bass. **OR** [2] L. Dee Fink. 2003. *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses*. Jossey-Bass. **OR** [3] Grant Wiggins and Jay McTighe. 2000. *Understanding by Design*. Association for Supervision & Curriculum Development. [ASCD] (See also: Jay McTighe, Grant Wiggins. 2004. *Understanding by Design: Professional Development Workbook*. ASCD.)

**Three Key Summaries of Important Research [for ALL Faculty].** [1] Marcia Baxter Magolda. 2001. *Making Their Own Way: Narratives for Transforming Higher Education to Promote Self-Development*. Stylus. [Fundamental to understanding liberal education including critical thinking and mature valuing.] [2] Lion F. Gardiner. 1994. *Redesigning Higher Education : Producing Dramatic Gains in Student Learning*. ASHE Higher Education Report. (All the fundamentals in 200 pp.) [3] Marcia Mentkowski and Associates 1999. *Learning that Lasts* Jossey-Bass. (Alverno and beyond)

**Two Major Collections of Teaching Resources:** [1] Bernice A. Pescosolido & R. Aminzade, Eds. 1999. *The Social Worlds of Higher Education: Handbook for Teaching in a New Century*. Pine Forge Press [55+ articles]. With a companion CD: *Field Guide for Teaching in a New Century: Ideas from Fellow Travelers*. (Includes 70+ additional items on pedagogical techniques.) [2] K. A. Feldman, & M. B. Paulsen, Eds. 1998. *Teaching and Learning in the College Classroom*. 2nd Edit. ASHE Reader / Ginn Press [50+ articles. ASHE = Association for the Study of Higher Education]

### **YOU CAN USE WRITING, EVEN IN LARGE CLASSES, WITHOUT GRADING KILLING YOU**

**Calibrated Peer Review (CPR)<sup>TM</sup>** “is a Web-based program that enables frequent writing assignments even in large classes with limited instructional resources. In fact, CPR can reduce the time an instructor now spends reading and assessing student writing.” Developed for science with \$\$ from NSF & Howard Hughes. <http://cpr.molsci.ucla.edu/>

**Microthemes.** Ray Smith. 1994. *Sequenced Microthemes: A Great Deal of Thinking for Your Students, and Relatively Little Grading for You*. *Teaching Resources Center Newsletter* 5  
<http://www.indiana.edu/~wts/cwp/assgn/microseq.html>

**Writing Across the Curriculum.** *Language and Learning Across the Curriculum* [National Council of Teachers of English] includes extensive bibliography by discipline. <http://www.sfasu.edu/lalac/> Discipline specific writing guides from George Mason <http://wac.gmu.edu/guides/GMU%20guides.html> and Marquette <http://academic.mu.edu/aswriting/index.htm> Annotated bibliography <http://www.iub.edu/~cwp/lib/wacgen.shtml>

### **IS IT WORKING? ASSESS AND DOCUMENT WHAT IS HAPPENING IN YOUR CLASS**

**Use Some “CATs:” Check on how any course is actually working:** Tom A. Angelo & K. Patricia Cross. 1993. *Classroom Assessment Techniques*. 2nd edit. Jossey-Bass. Related examples online as *Classroom Assessment Techniques* <http://www.siue.edu/%7Ededer/assess/catmain.html> and *FLAG (Field-Tested Learning Assessment Guide for Science, Math, Engineering, and Technology)* <http://www.flaguide.org/>

**Course Portfolios.** [1] Pat Hutchings (Ed). 1998. *The Course Portfolio: How Faculty Can Examine Their Teaching To Advance Practice And Improve Student Learning*. Stylus. [2] Daniel Bernstein et al. 2006. *Making Teaching and Learning Visible: Course Portfolios and the Peer Review*. Anker. [3] Carmen Werder. 2000. *How to prepare a course portfolio*. <http://pandora.cii.wvu.edu/cii/resources/portfolios/preparation.asp> [4] Gallery of Teaching and Learning, Carnegie Foundation <http://gallery.carnegiefoundation.org/> [5] More Examples (several disciplines): Indiana U. <http://www.indiana.edu/~deanfac/portfolio/def.html> Xavier U. <http://cat.xula.edu/initiatives/cpwg/> [Google for more.]



**New Assessment Approach: Knowledge Surveyor**—a new course, curriculum, and program assessment tool; helps faculty discover strengths and weaknesses--moves beyond peer observation and conventional student evaluations. (still developing) <http://www.knowledgesurveyor.und.edu/> See: Edward Nuhfer & Delores Knipp. 2003. The Knowledge Survey: A Tool for All Reasons. *To Improve the Academy* 21:59-78.  
[http://www.knowledgesurveyor.und.edu/includes/nuhfer\\_knipp\\_2003.pdf](http://www.knowledgesurveyor.und.edu/includes/nuhfer_knipp_2003.pdf)

**Great Starting Sites:** : **Assessment Resources**, National Resource Center on the First-Year Experience and Students in Transition, University of South Carolina. Includes a *Searchable Database of Assessment Instruments*, a list of *Learning Styles Assessment Instruments*, *Invited Essays* on key topics and programs, a *List-serve* with *Searchable Archives* AND **Resources for First, Second and Senior Year Courses** including primers, syllabi and more  
<http://www.sc.edu/fye/resources/index.html>

### Want to Find More Resources?

**Jossey-Bass** at <http://www.josseybass.com/WileyCDA/Section/id-131511.html> publishes over 100 titles on *teaching and learning in higher education*. The **Association of American Colleges and Universities (AAC&U)** publishes books and journal issues on undergraduate education, especially liberal learning and diversity, <http://aacu-secure.nisgroup.com/acb/stores/1/category.cfm?SID=1&> and also publishes two helpful journals, *Liberal Learning and Peer Review*. I also like *The National Teaching & Learning Forum* <http://www.ntlf.com/>

**NSF & NRC: National Science Foundation and National Research Council/National Academy Press.** Entire text of each book can be read FREE online. *These major groups are trying to help faculty understand and change.*

- Committee on Undergraduate Science Education. **1999.** *Transforming Undergraduate Education in Science, Mathematics, Engineering, and Technology.* Center for Science, Mathematics, and Engineering Education, National Research Council, National Academy Press. [Book Available Free Online <http://books.nap.edu/catalog/6453.html> ]

- Commission on Behavioral and Social Sciences and Education (CBASSE). **2000.** *How People Learn: Brain, Mind, Experience, and School: Expanded Edition.* National Academy Press. Read online and print free or buy at <http://fermat.nap.edu/books/0309070368/html/> [REPLACED: Bransford, J. D., Brown, A. L. & Cocking, R. R., Editors. 1999. *How People Learn: Brain, Mind, Experience, and School.*]

- McCray, R. A., R. L. DeHaan, and J. A. Shuck. Eds. **2003.** *Improving Undergraduate Instruction in Science, Technology, Engineering, and Mathematics: Report of a Workshop.* National Research Council, National Academy Press. [Entire Book Available Free Online <http://books.nap.edu/catalog/10711.html> ]

- Fox, M. A, and N. Hackerman. **2003.** *Evaluating and Improving Undergraduate Teaching in Science, Technology, Engineering, and Mathematics.* Committee on Undergraduate Science Education. National Research Council, National Academy Press. [Entire Book Available Free Online <http://books.nap.edu/catalog/10024.html>]

- M. Suzanne Donovan and John D. Bransford, editors. **2005.** [Three titles:] [1] *How Students Learn: Mathematics in the Classroom.* [2] *How Students Learn: Science in the Classroom.* [3] *How Students Learn: History in the Classroom.* Committee on How People Learn: A Targeted Report for Teachers. National Research Council. National Academy Press [“... how the principles of learning can be applied in science [or math or history] at three levels: elementary, middle, and high school. Leading educators explain in detail how they developed successful curricula and teaching approaches...”] Read online and print free or buy at <http://www.nap.edu/catalog/10126.html>

- Klatchman, M. and K. R. Krodinger. **2005.** *How Students Learn Functions.* Chapter 8 in M. Suzanne Donovan and J. D. Bransford, editors, *How Students Learn: Mathematics in the Classroom.* National Research Council, National Academy Press. [Entire Book Available Free Online <http://www.nap.edu/catalog/11101.html> ]

- NSF. **1998.** *Shaping the Future, Volume II: Perspectives on Undergraduate Education in Science, Mathematics, Engineering, and Technology.* nsf98128 <http://www.nsf.gov/pubs/1998/nsf98128/nsf98128.htm>

- NSF. **2000.** *A Description and Analysis of Best Practice Finding of Programs promoting participation of underrepresented undergraduate student in Science, Mathematics, Engineering and Technology.* nsf0131. <http://www.nsf.gov/pubs/2001/nsf0131/nsf0131.pdf>

- [NSF] Levine, Felice, Ronald F. Abler and Katherine J. Roish. **2004.** *Education and Training in the Social, Behavioral and Economic Science: A Plan of Action.* National Science Foundation. nsf0442 [Includes chapters on diversity and on graduate and undergraduate education.]