

Being Equity-Minded in the Teaching of Mathematics

Nov 27, 2018

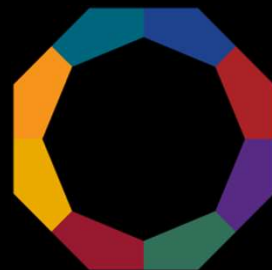
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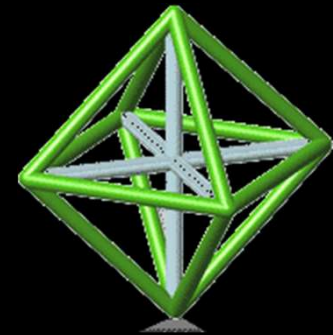


**CLAREMONT COLLEGES
CENTER FOR TEACHING
AND LEARNING**

Math for America Los Angeles



PCMI/Teacher Leadership Program



Outline

1. Active Learning and Equity
2. Belongingness
3. Equity-Oriented Habits of Mind
(applied to various active learning scenarios)

Working Defn of Active Learning

Teaching strategies that reduce classroom time in which students passively receive information and increase the time in which they do, think, predict, discuss, practice, apply, or otherwise engage with course content so as to provide students with opportunities to reflect on their learning and/or receive feedback from other students or an instructor

Active learning increases student performance in science, engineering, and mathematics

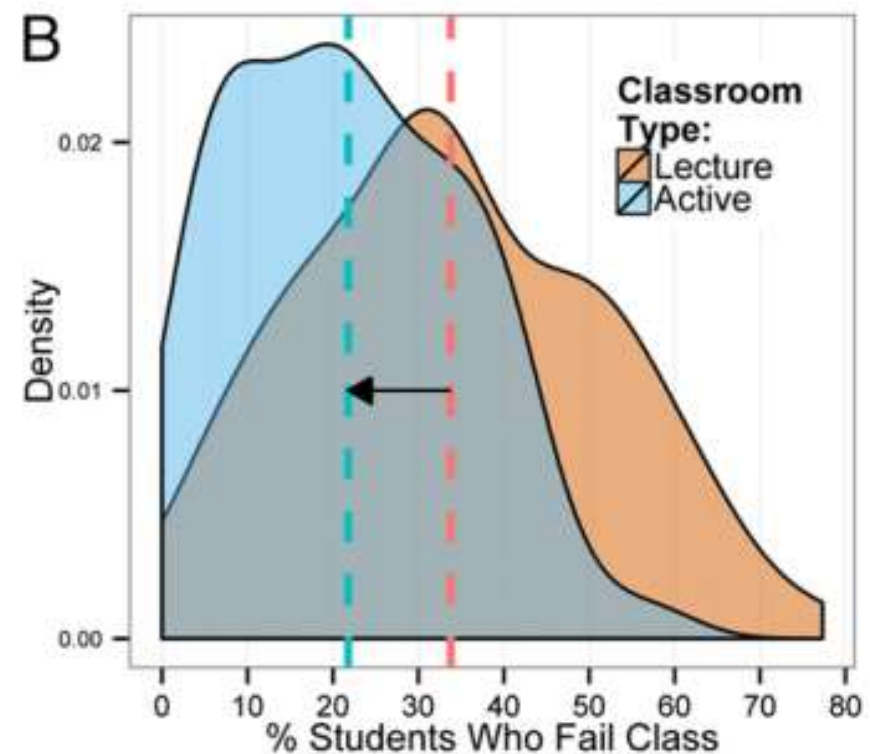
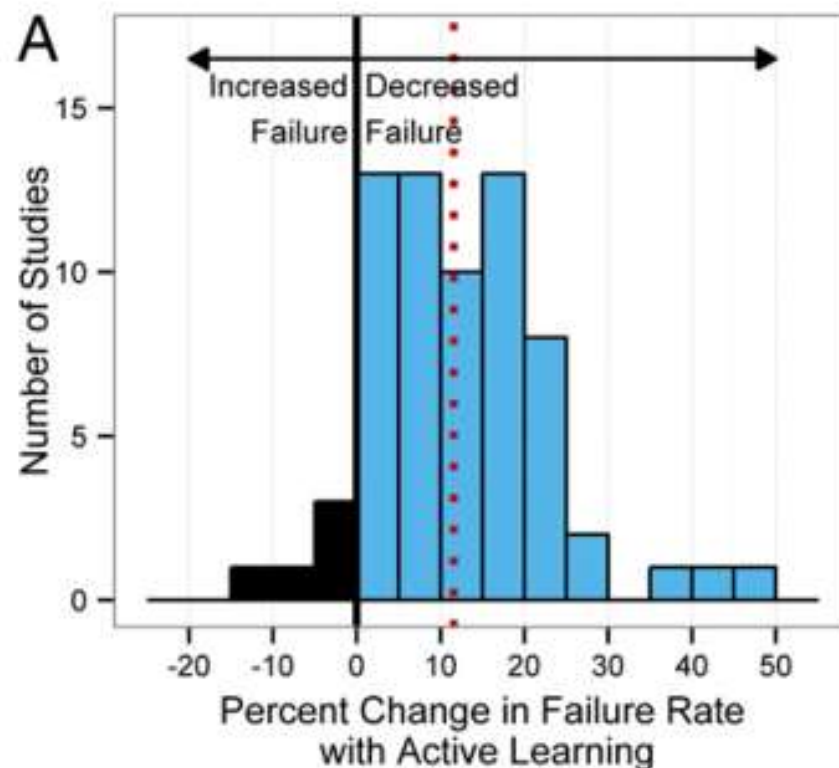
Scott Freeman^{a,1}, Sarah L. Eddy^a, Miles McDonough^a, Michelle K. Smith^b, Nnadozie Okoroafor^a, Hannah Jordt^a, and Mary Pat Wenderoth^a

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Edited* by Bruce Alberts, University of California, San Francisco, CA, and approved April 15, 2014 (received for review October 8, 2013)

To test the hypothesis that lecturing maximizes learning and course performance, we metaanalyzed 225 studies that reported data on examination scores or failure rates when comparing student

225 studies in the published and unpublished literature. The active learning interventions varied widely in intensity and implementation, and included approaches as diverse as occasional group



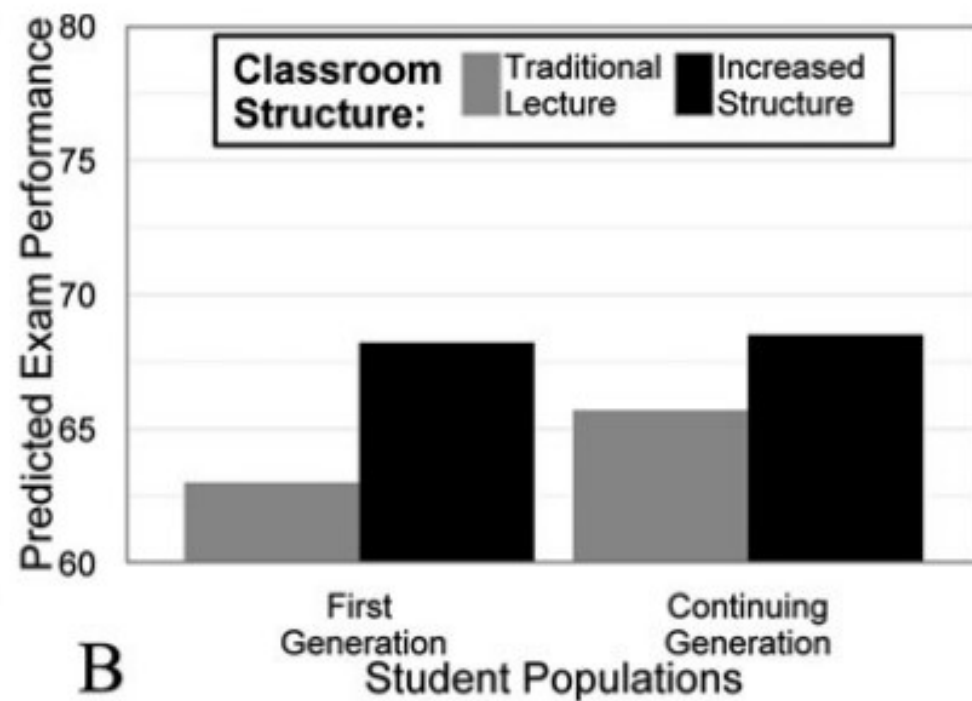
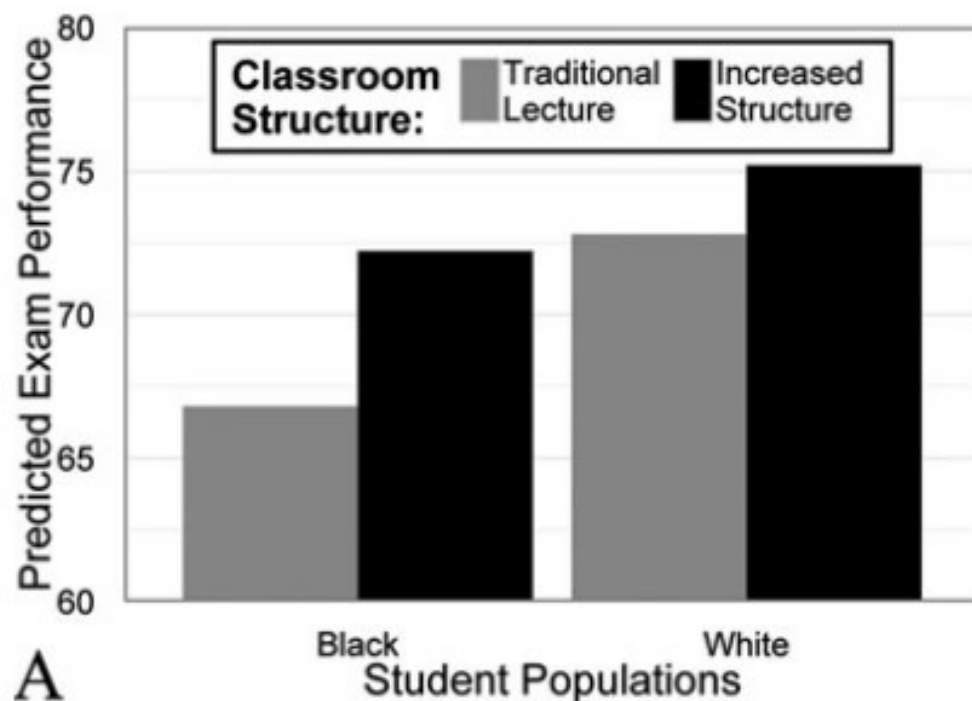
Article

Getting Under the Hood: How and for Whom Does Increasing Course Structure Work?

Sarah L. Eddy* and Kelly A. Hogan†

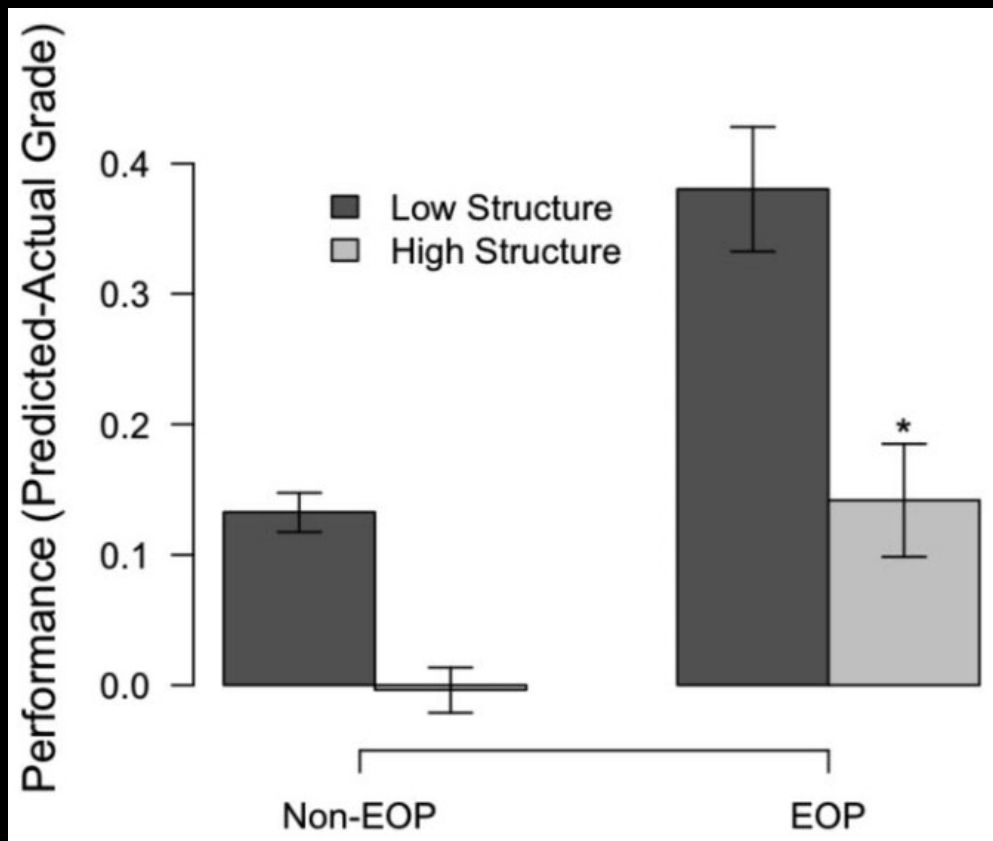
*Department of Biology, University of Washington, Seattle, WA 98195; †Department of Biology, University of North Carolina, Chapel Hill, NC 27599

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Increased Structure and Active Learning Reduce the Achievement Gap in Introductory Biology

David C. Haak,^{1*} Janneke HilleRisLambers,¹ Emile Pitre,² Scott Freeman^{1†}



Benefits for Women and Men of Inquiry-Based Learning in College Mathematics: A Multi-Institution Study

Sandra L. Laursen, Marja-Liisa Hassi, Marina Kogan, and Timothy J. Weston
University of Colorado Boulder

women in non-IBL classes reported statistically much lower gains than their male classmates in several important domains: understanding concepts, thinking and problem-solving, confidence, and positive attitude toward mathematics. In fact, both men and women reported higher learning gains from IBL courses than from non-IBL courses, but traditional teaching approaches did substantial disservice to women in particular, inhibiting their learning and reducing their confidence. These differences for women were independent of their prior mathematics achievement. Women's spontaneous write-in comments echoed this finding: IBL women wrote

Overall, it appeared that non-IBL courses tended to reinforce prior achievement patterns, helping the "rich" to get "richer." In contrast, IBL courses seemed to offer an extra boost to lower-achieving students, especially among pre-service teachers. Yet there was no evidence of harm done to the strongest students. Indeed, high-achieving students may be encouraged by an IBL

Equity-Mindedness



Estela Bensimon

“Equity-minded faculty focus intentionally on the educational outcomes of different groups of students and are able to understand any inequalities in the context of a history of exclusion, discrimination, and educational apartheid. ...”

Equity-Mindedness



Estela Bensimon

“Equity-minded faculty see their institution [and themselves] as bearing primary responsibility for eliminating those inequitable outcomes, rather than making students responsible for overcoming ‘deficits’ (lack of knowledge, skills, or qualities). ...”

Equity-Mindedness



Estela Bensimon

“ Most importantly, equity-minded individuals are far more likely to understand that the beliefs, expectations, and actions of individuals influence whether minority group students are construed as being capable or incapable. ”

Silent Think Time (1)

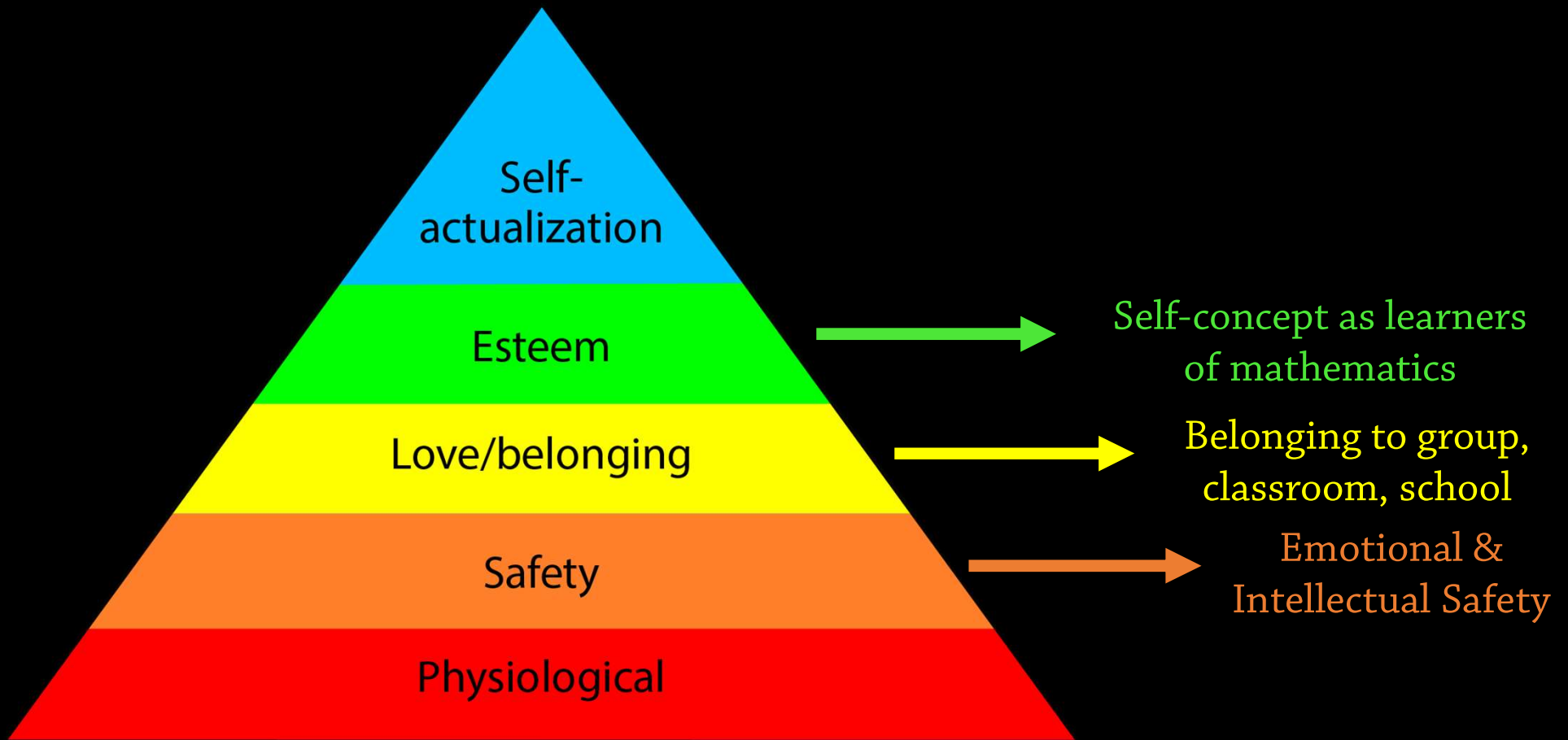
1. Think about a student who you perceive to feel a **strong sense of belonging** in your class. Write about an interaction that you had with them that gives you that perception.
2. Think about a student who you perceive to feel a **lack of belonging** in your class. Write about an interaction that you had with them that gives you that perception.

*(I will not ask you to share these.
This is just for you to reflect.)*

Silent Think Time (2)

3. What is one thing you wish students would do more of in your classes to succeed?
4. Now think about the student with a **strong sense of belonging** from Question #1. Did that student do this thing?
5. Now think about the student with a **lack of belonging** from Question #2. Did that student do this thing?

Maslow's Hierarchy of Needs (1943)



Source: <https://commons.wikimedia.org/wiki/File:MaslowsHierarchyOfNeeds.svg>

CCSS-M SMPs

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

These Standards for Mathematical Practice are mathematical *habits of mind*.

See Cuoco, A., Goldenberg, E.P. and Mark, J., 1996. Habits of mind: An organizing principle for mathematics curricula. *The Journal of Mathematical Behavior*, 15(4), pp.375-402.

Equity-Oriented Habits of Mind

Let's get in the practice of asking ourselves these questions any time we make instructional choices, big or small:

1. Who is likely to benefit? Who might not?
2. Who might feel included or excluded?
3. How would I know if I need to intervene?

Same Classroom + Different Students = Different Experiences



Brown, S., 2018. "E-IBL, Proof Scripts, and Identities: An Exploration of Theoretical Relationships." RUME 2018 Conference paper. http://sigmaa.maa.org/rume/crume2018/Abstracts_Files/Submissions/19_E-IBL__Proof_Scripts__and_Identities__An_Exploration_of_Theoretical_Relationships.pdf

Eddy, S.L., Brownell, S.E., Thummaphan, P., Lan, M.C. and Wenderoth, M.P., 2015. "Caution, student experience may vary: social identities impact a student's experience in peer discussions." *CBE—Life Sciences Education*, 14(4), 1-17.

Langer-Osuna, J.M., 2011. "How Brianna became bossy and Kofi came out smart: Understanding the trajectories of identity and engagement for two group leaders in a project-based mathematics classroom." *Canadian Journal of Science, Mathematics and Technology Education*, 11(3), pp.207-225.

Context #1: Think-Pair-Share



Please think silently for a moment...

When I ask students to think-pair-share...

1. Who is likely to benefit? Who might not?
2. Who might feel included or excluded?
3. How would I know if I need to intervene?

Context #2: Group Work

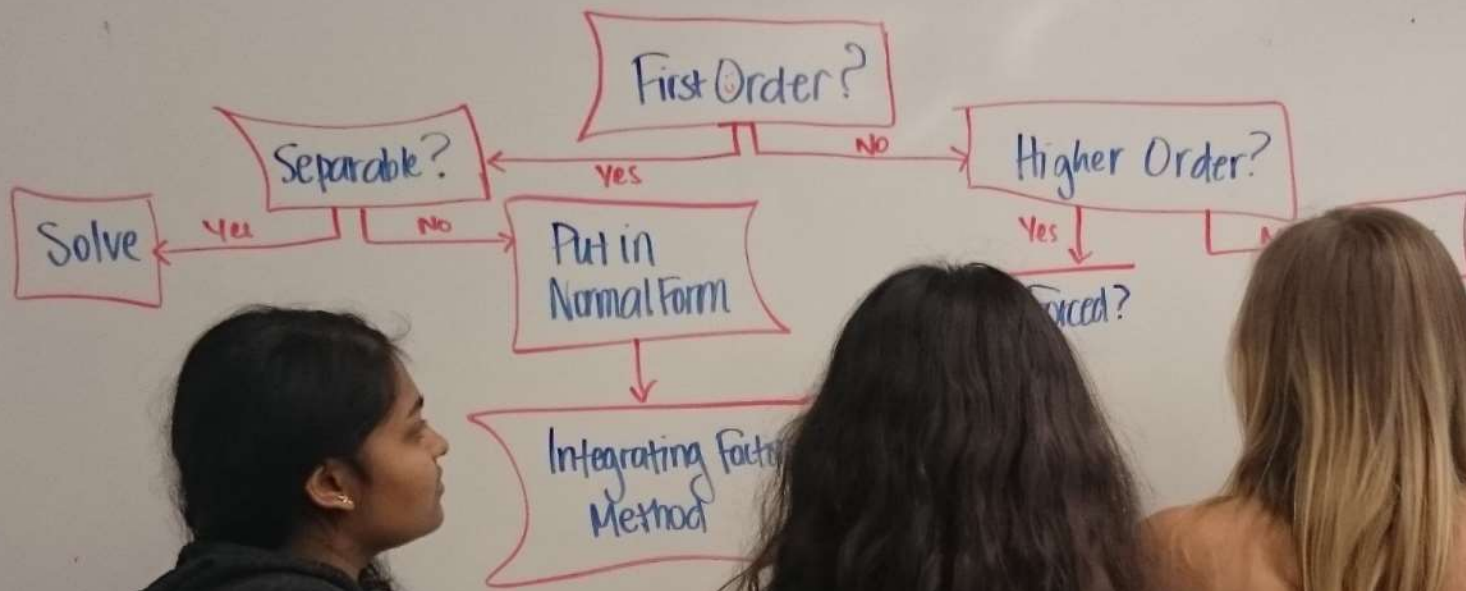


Please think silently for a moment...

When I ask students to work in small groups on a task...

1. Who is likely to benefit? Who might not?
2. Who might feel included or excluded?
3. How would I know if I need to intervene?

Context #2b: Group Work @ VNPS

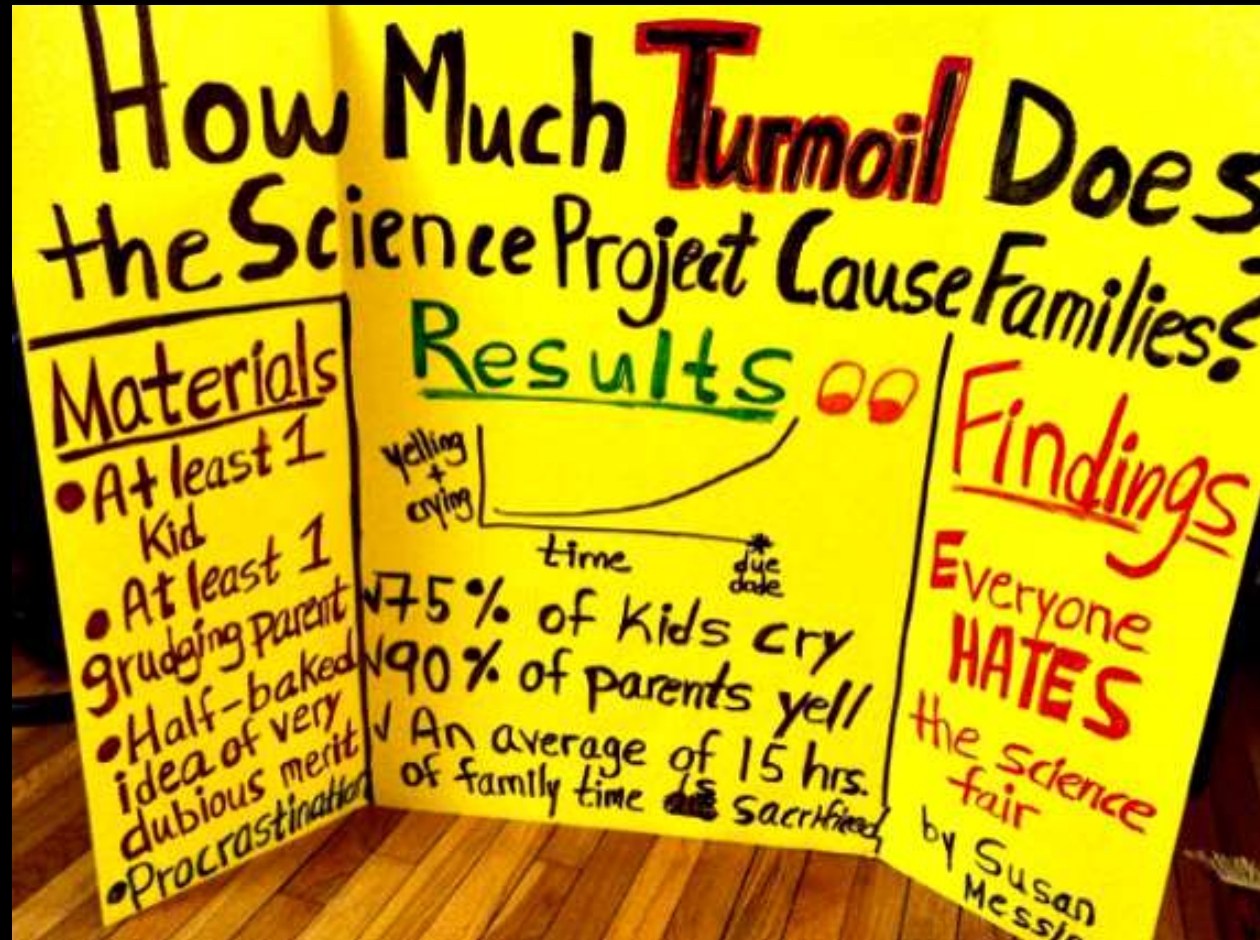


Please think silently for a moment...

When I ask students to work at the board together...

1. Who is likely to benefit? Who might not?
2. Who might feel included or excluded?
3. How would I know if I need to intervene?

Context #3: Open-Ended Projects



https://www.huffingtonpost.com/susan-messina/that-fake-science-fair-poster-that-went-viral-i-made-it-heres-why_b_5053008.html

Please think silently for a moment...

When I assign open-ended projects to students...

1. Who is likely to benefit? Who might not?
2. Who might feel included or excluded?
3. How would I know if I need to intervene?