



Changing the math trajectory of underperforming students

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The Plan

- Weave a story through:
 - Priming
 - IBM and Chess
 - Just the right frustration
 - Golf
 - HBR's #1 Big Idea for 2010

Priming

- from Neuroeconomics – meeting of economics, behav psychology, & neuroscience
- humans act like humans
- influenced by choice architecture
- and “primes”
 - fresh-baked cookies at open house
 - fresh vegetables at front of grocery store
 - eBay study

Priming in Math Instruction

•students already primed: stereotype threat

- racial priming for IQ ...it got me really frustrated, and I hated it!
- gender priming for math

•fixed vs incremental intel When I got an answer wrong three times in a row...I was getting really jittery. Then...I felt like slamming my head on the desk.

•incidental priming

Prime for Success

- respect; belief in their ability to succeed
- change the way these students see mistakes
- Now: mistakes = I'm stupid
- Shift: mistakes = opportunity to learn

IBM & Chess

- 1997 - Karpov vs Deep Blue -- Chess Master vs Computer
- 6 games -- Kasparov 3, Deep Blue 2, Draw 1



Knowing ≠ Learning

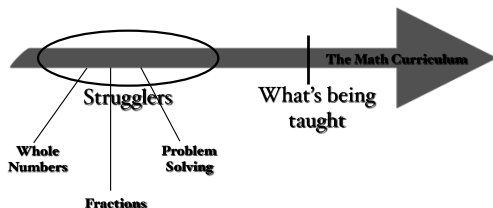
- Deep Blue knew every possible move
- Analyze 200 million possible moves per second
- but it was dumb



Mistakes Part of Learning

- IBM testing learning and Deep Blue couldn't
- TD Gammon -- play 1.5 million games against itself -- lose and learn
- Expert without the fire extinguishers
- Mistakes are essential, if we learn from them

Mistakes: Frustrating, but not too frustrating



Target Math for Acceleration

- Can't do everything & still catch up
- Foundations: understand the system
- Fluency & Facility: fast & accurate with recurring skills & procedures
- Options with the unfamiliar (exercises vs problems)

Adapt the Math to Stay in the Zone



Just the Right Frustration Can be Very Satisfying

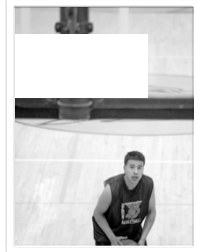
But Need Good Feedback

- Can't learn from mistakes without feedback
- Reinforce the right
- Correct the wrong
- try practicing putting without seeing the ball go in the hole



Corrective Feedback

- or practicing free throws without seeing the ball go in the basket



Corrective Feedback

- or practicing math procedures without knowing that the answers are right

NAME				
Math Assignment				
95	81	49	33	70
+ 42	+ 69	+ 72	+ 4	+ 3
96	62	62	62	26
+ 70	+ 40	+ 75	+ 18	+ 15
74	72	64	78	51
+ 12	+ 20	+ 64	+ 33	+ 42
52	12	85	96	42
+ 17	+ 49	+ 72	+ 67	+ 95

What Really Motivates Workers

Understanding the power of progress

When workers sense they're making headway, their drive to succeed is at its peak.

HBR #1 Idea for 2010

Change the Trajectory

- Prime students for success
- Consider mistakes essential to learning
- Provide Immediate, Corrective Feedback
- Show the Progress that comes with Effort

Questions/Comments

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- & one more thing...
