

What Numeracy Can Learn From Literacy...

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The Great Reading Debate: Phonics vs. Whole Language

<ul style="list-style-type: none"> ■ Phonics: ■ Symbol patterns ■ Memorization ■ Reading words ■ Back to basics ■ Skills drills ■ Spelling tests ■ Reductionist 	<ul style="list-style-type: none"> ■ Whole Language: ■ Reading for meaning ■ Context based ■ Motivational ■ Free reading ■ "Inventive" spelling, grammar, punctuation, etc. ■ Holistic/Constructivist
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History:

- 18th Century: Reading Primers and Phonics
- 19th Century: Horace Mann against phonics led to "look-say" i.e. Dick and Jane
- 1950's: Rudolf Flesch's *Why Johnny Can't Read* back to phonics
- 1980's: Whole Language
- 1990's NAEP Reading Scores Decline
- 2000: Back to basics

Whole Math?

- 1989 NCTM Standards: conceptual understanding and problem solving skills
- 1994 Reform Calculus: *Harvard text* Hughes-Hallett et.al.
- 1997 "Reform Calculus has been a disaster"!?
- 2000 Math tutoring franchises
- March 13, 2008 National Math Panel: "America's math education system is broken"
- "curriculum must simultaneously develop **conceptual understanding, computational fluency,** and problem solving"

Literacy: reading and writing?

- John Fee: *What is Literacy?*
- A discourse: "identity kit" for a socially meaningful group i.e. woman, American, middle class, factory worker, etc.
- Primary discourse: family; all others **secondary**.
- Literacy: **control of language in a secondary discourse**
- Many literacies!
- Numeracy: **control of numbers in context**

Acquisition vs. Learning

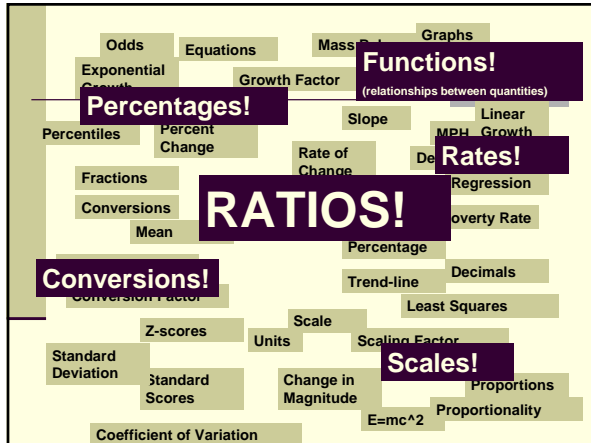
- Acquisition: subconscious by exposure to models and experimentation, i.e. constructivist
- Learning: conscious by teaching, explanation and analysis of component parts, i.e. reductionist
- Patricia Cline Cohen *Emergence of Numeracy*: commercial arithmetic texts 1800: board feet for houses, cost per yard of cloth, **problem based memory learning**
- 1820's: New Math! Discovery based

Acquisition AND Learning

- Balanced Literacy:
 - Emphasize acquisition in context, with learning for transfer
- Embedded Literacy: Just in Time Learning
- *Applications and Misapplications of Cognitive Psychology to Mathematics Education* Anderson/Reder/Simon:
- Critique *extreme* constructivism and situated learning
- **Need to include ability to transfer as a specific goal in instruction**

Transfer and Schemata

- *Cultural Literacy* by E.D. Hirsch Jr.
- “successful communication depends on shared associations”
- “literacy requires us to have **intensive knowledge of relationships** and **extensive knowledge of specifics**”
- “a well developed schema helps us manipulate and connect information rapidly”



Numeracy Phonics:

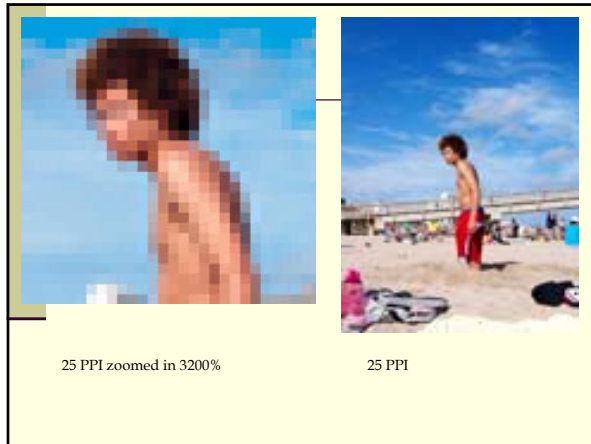
- **Ratio:** A comparison of the relative size of 2 quantities. The ratio of Qty. A to Qty. B is 2:3 means for every 2 A units we have 3 B units.
- **Rate:** A ratio between quantities (typically with different units); with the 2nd qty typically scaled to 1 and read with “per”, i.e. mph, mpg, etc.
- **Percentage:** A rate with 2nd quantity scaled to 100.
- **Conversion:** A ratio indicating a change in units.
- **Scale:** A ratio indicating a change in magnitude.

Skills Drills

- The ratio of boys to girls is 2 : 3, if there are 10 boys how many girls?
- $2/3 = 10/x \dots 2x = 30 \dots$
- 15 girls!
- You get 18 out of 20 questions correct. What percentage of the questions did you answer correctly?
- $18/20 = 0.9 \dots$
- 90% correct!

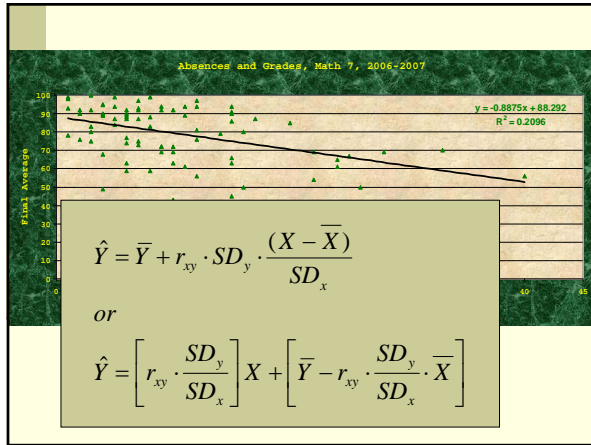
Age Dependency Ratios

- The **age dependency ratio**, is derived by dividing the combined under-18 and 65-and-over populations by the 18-to-64 population and multiplying by 100.
 - $(73.9 + 37.9)/189.8 = 0.589 * 100 = 58.9$
 - Use 58.9 in a sentence...
 - The ratio of under 18 and 65+ to 18-64 year olds is 58.9 to????
 - 58.9 : 1 ???
 - 58.9% ???
- 58.9% of the people aged 18-64 years old are actually both under 18 AND over 65 years old!**




2008 Math Panel

- RE-Emphasis on algebra
- Bernard Madison *Articulation and QL*: GATC sequence in high school mathematics
- Myopic focus on Calculus preparation abandons middle school math numeracy topics!
- Two-thirds of Fall 2005 math enrollments are remedial/introductory math (CBMS)
- “Reform Calculus is Dead!”
- Algebra in context...modeling, statistics, etc.



Insanity (n):



- Keep doing the same thing over and over and expect different results. -MMB

