



Health Numeracy

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What is Numeracy?

- An “ability and inclination” to use numbers and number principles in everyday life.
 - Literacy uses an alphabetic code
 - Numeracy uses a numeric code
- We are a data-drenched and data-driven society

How long will it take me to get somewhere? How fast do I need to go? How much gas do I need to budget for? I need to exercise more, so how much more – can I monitor my health by using measures and indicators such as weight, BMI, self ratings?



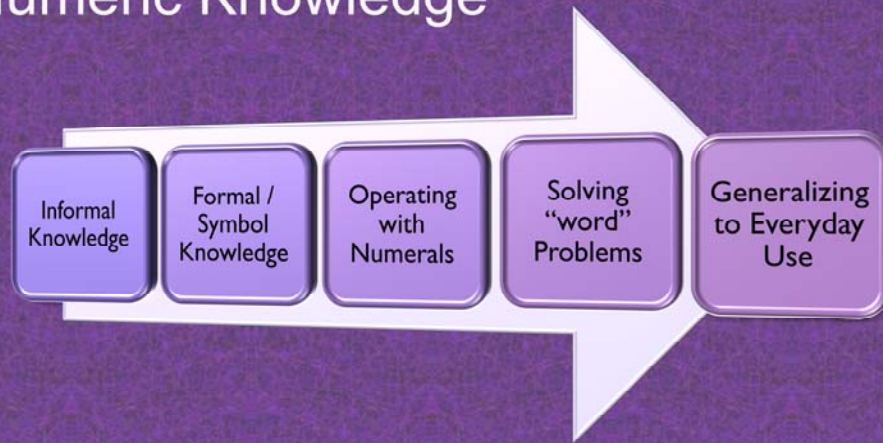
More About Numeracy

- Also known as “numeric literacy”
- Early origins of numeracy known as a “number sense,” which is an awareness that numerals are representative of underlying concepts of quantity.
- What are these concepts?

Concepts:

Counting, comparing and ordering, equal partitioning, composing and decomposing numbers, and operating by adding and taking away.

Basic Progression of Numeric Knowledge

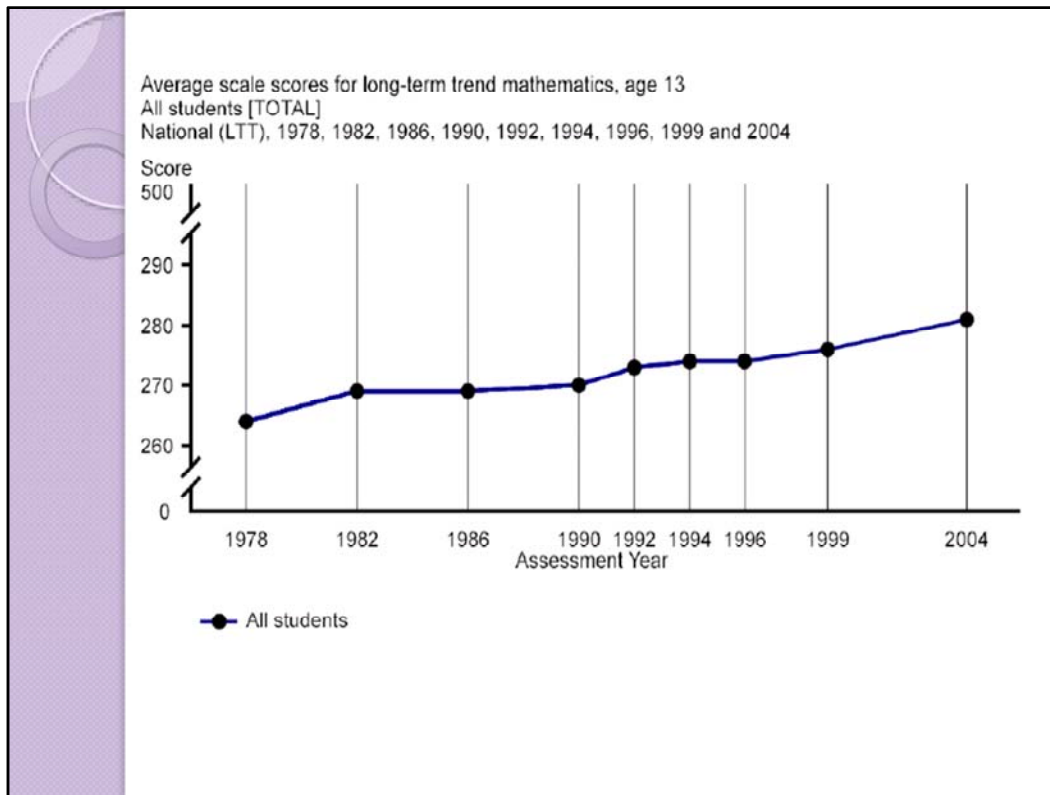




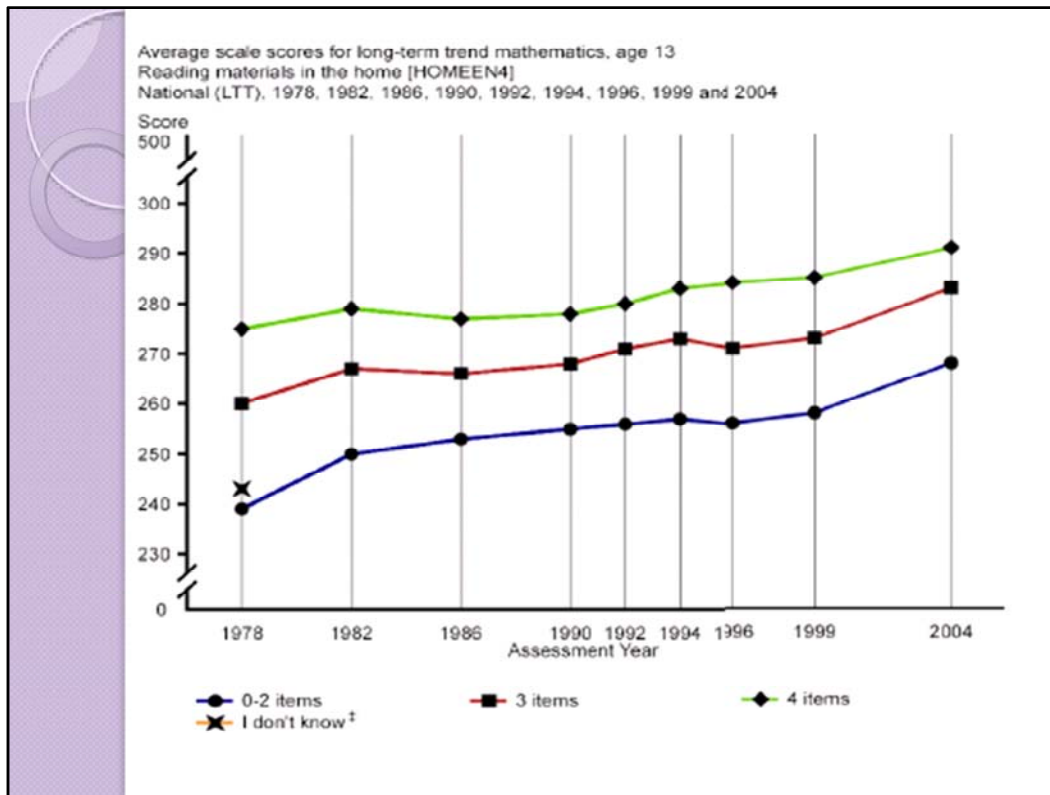
The Effect of Schooling on Numeracy Development

- Big news: math scores improving!
- Society cannot rely on schooling to enhance outcomes for at-risk groups in mathematics
- However, schools provide opportunities to engage in the subject matter of mathematics

Given that schools appear to maintain a social and economic status quo, schools do not reduce risk for children with math problems, medical communities will “inherit” people with low math skills. This is not necessarily the case in North Carolina, SIP results for math interventions for students with disabilities appear staggering, according to Susan Davis, Section Chief, Program Improvement and Professional Development Exceptional Children Division NC Dept of Public Instruction

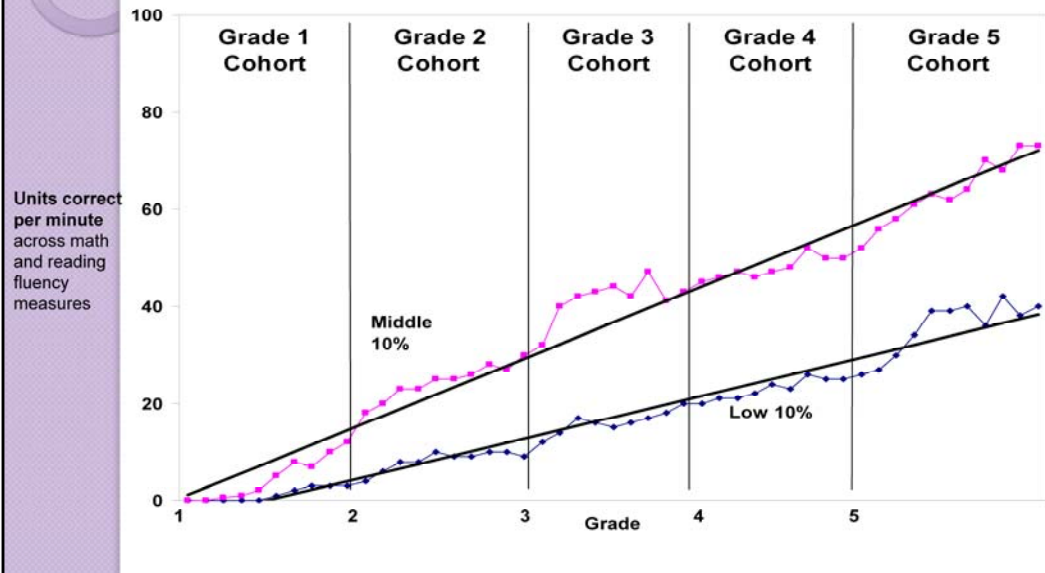


OK, we're improving. The statistics would say that this improvement is significant.



Hart & Risley (1995) use book and print awareness as means to operationalize SES differences. Here, although things look like they're improving, there are still key social differences that aren't being improved, and the neediest are being left behind.

Students on a low academic trajectories fall farther and farther behind in spite of interventions



Health Numeracy

(Golbeck, Ahlers-Schmidt, Paschal, & Dismuke, 2005)

- “Accessing, processing, interpreting, communicating, and acting on numerical, quantitative, graphical, biostatistical, and probabilistic health information necessary for effective health decisions” (p. 375).

- Four categories:

1. **Basic**
2. **Computational**
3. **Analytical**
4. **Statistical**

1. Basic: Identifying numbers of pills to take from a prescription bottle. (matching number on bottle with pills)
2. Computational: determining net carbohydrates, calories, or nutrients based on information from a label. Computing a BMI.
3. Analytical: determining whether cholesterol levels are within a normal range, comparing insurance benefits across companies.
4. Statistical: Understanding risk, life expectancy, methods of RCTs in determining safety and efficacy.

Examples of Health Numeracy

- Consider a patient undergoing multiple daily insulin injections for diabetes (Montori & Rothman, 2005):
 - **Counting** carbohydrates to match diet to insulin dose
 - Self-monitoring blood glucose levels

Making insulin dose adjustments to prevent hypoglycemia

Noticing trends that should lead to program changes

In addition to aiding in weight management, being able to calculate caloric intake, and other nutritional information is important for patients with “chronic illnesses such as hypertension, heart failure, diabetes, and obesity,” who are often given “specific dietary guidelines” by their healthcare providers. (Rothman, Housam, Weiss, Davis, Gregory et al., 2006, p. 391).



Health Numeracy Literature Review

- Four important questions:
 1. **Are numeric literacy and health numeracy important to healthy outcomes for patients with medical needs?**
 2. **How could low health numeracy specifically impact a patient?**
 3. **What is the role of numeric literacy in promoting healthy behavior?**
 4. **What are some specific ways to teach patients (ranging from children to adults) numeric literacy?**




Is Health Numeracy Important?

- Patients with higher levels of numeracy are more active in their own treatment programs.
- With higher levels of numeracy, overall levels of risk decrease across medical and health problems (Montori & Rothman, 2007).

Patients, especially those with chronic illnesses, are often responsible for self-managing their health, and numeracy plays an important role in their ability to “safely and efficaciously self-administer treatments.” (Rothman, Cherrington, Montori & Pignone, 2008, p. 585).

Quoting Ginde, Clark, Goldsteing & Camargo from 2008, “Compared to general health literacy, numeracy may be an equal or better predictor of unfavorable outcomes in self-managed chronic conditions, such as asthma and anticoagulation control”

There is a negative correlation between numeracy and BMI. (Huizinga, Beech, Cavanaugh, Elasy & Rothman, 2008, p. 1967).



How Can Low Numeracy Negatively Impact a Patient?

Nelson, Reyna, Fagerlin, Lipkus & Peters (2008).

- Misunderstanding instructions on medication bottles
- Miscomprehending “eligibility for financial assistance”

“Self-reported poor health, health disparities, poor health knowledge and disease self-management skills, and choosing lower-quality health options” and “inferior disease management” are all effects of low health numeracy Nelson, Reyna, Fagerlin, Lipkus & Peters (2008, p. 263).

“Numeracy... has been associated with outcomes such as poor anticoagulation control among patients taking anticoagulants and history of hospitalization in asthma” Ancker & Kaufman (2007, p.713).

Some Interventions

- For young children and adolescents, school-based partnerships are key
- School psychologists can be strong treatment providers for both school-based numeracy and health numeracy.
- <http://www.ecu.edu/psyc/>
 - ECU's Pediatric School Psychology Program
 - Health Psychology Ph.D.
 - Dr. Chris Riley-Tillman, Dr. Mike Brown, & Dr. Sam Sears

Teaching programs generally difficult to establish and maintain as students grow older

Accommodations are more common for adults

“The fact that even basic numeracy tasks may be perceived as more demanding if positioned within an unfamiliar context challenges information specialists and Web designers to construct Internet-based information to accommodate diverse health literacy skills.” (Donelle, Arocha & Hoffman-Goetz, 2008, p. 6)

“Potential interventions could include color-coded measuring devices that replace measurement numeracy, picture- or table-based materials that replace medication instructions, simplification of current labels to ease interpretation, and computerized interventions that convert mathematical or instructions into goal-oriented text, pictures, or verbal instructions.” (Rothman, Cherrington, Montori & Pignone, 2008, p.591).

Ulcerative Colitis, Diet Management Program (currently being piloted)

- Focus on frequent formative assessment
- Functional examination of daily regimen
 - Use MS word to create a “table” but extend the table out to look like a grid / chart.
 - On the left side of the grid, create dynamic rating scale (1-100) for item related to daily reported comfort.
 - On same scale, indicate functional variables on the right side (1-10 agreement):

Example of a rating scale: 1-30: frequent and disruptive bouts of pain; 31-40: very uncomfortable but not disruptive; 41-60: uncomfortable overall; 61-80: uncomfortable; 81-90: comfortable; 91-100: very good.

Examples of functional variables: Food was eaten at regular time intervals, Avoided non-recommended foods, Took medication regularly, Exercise, etc.