

Real-World Reasoning in the Middle School Mathematics Classroom

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Purpose of Presentation

- ▶ To **connect** research on **real world** mathematics implementation in the middle grades to **classroom practice**.

Roadmap of Presentation

- ▶ **Common Core State Standards**
- ▶ **Research on teachers' implementation of real-world reasoning and problem solving**
- ▶ **Authentic applications to classroom practice and sample lesson plans**

Common Core State Standards

Advocate for use of “**real-world**” mathematics
Examples from the CCSS:

- ▶ 6.EE.B.6: Use variables to represent numbers and write expressions when solving a **real-world** or mathematical problem
- ▶ 7.EE.B.3: Solve multi-step **real-life** and mathematical problems
- ▶ 8.EE.C.8c: Solve **real-world** and mathematical problems leading to two linear equations in two variables.
- ▶ MP4: Model with mathematics.

Background

- ▶ What is **Quantitative Literacy**?

| Typical School Math | Quantitative Literacy (QL) |
|--|---|
| <ul style="list-style-type: none"> • Focus on abstract, procedural knowledge | <ul style="list-style-type: none"> • Focus on problem-based, investigative thinking |
| <ul style="list-style-type: none"> • Real-world mathematics implemented in the form of “story problems” | <ul style="list-style-type: none"> • Real-world mathematics implemented in the form of “authentic tasks” |
| <ul style="list-style-type: none"> • Hypothetical situations | <ul style="list-style-type: none"> • Genuine, real-world, interdisciplinary situations |

Background Research

- ▶ What do **teachers** need to implement **QL**?

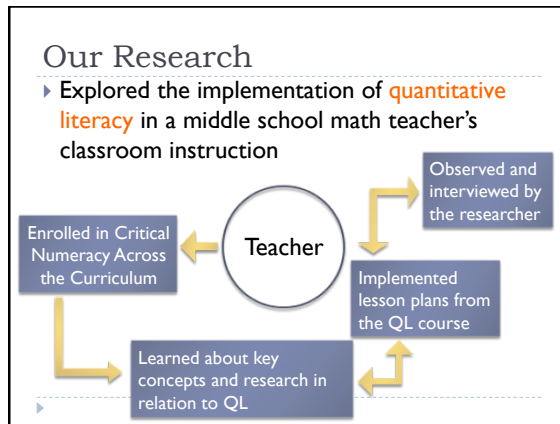
- **Wider view** of mathematics
- **See** the real-world applications of mathematics
- **Situate** mathematics content in real world scenarios

“READ AND WRITE THE WORLD WITH MATHEMATICS”

Gutstein (2006)

Critical Numeracy Across the Curriculum

- ▶ Mathematical Literacy
- ▶ Statistical Literacy
- ▶ Scientific and Health/Nutrition Literacy
- ▶ Social Numeracy and Financial/Economic Literacy
- ▶ Information, Media, and Internet Literacy
- ▶ Quantitative Literacy and Social Justice
- ▶ Assessing Quantitative Literacy
- ▶ Policy and Practice Implications of QL for K-12+ and Teacher Education



Data Collection

▶ Observations, Interviews, Lesson Plans

Sample Questions:

- Why do you use QL in your classroom?
- How do you implement QL in your classroom?
- Has there been any change in the QL you teach in your math classroom?

Results

▶ Authentic Application of Mathematics Concepts

"I use **QL** in my class because it is important for students to be able to **apply** their mathematical skills to the **real world**. Applying their knowledge to solve a problem in a different context **involves a deeper level of thought**" (Teacher).

Results

▶ Connection to Math Standards

"**QL** is not a part of the regular curriculum in eighth grade. There is **not enough time** to cover the mandated material as well as teaching **QL**" (Teacher).

Sample Activities

Number Sentences about the cost of owning pets

Writing Systems of Equations based on gym-membership fees

Working with conversions and fractions based on food recipes

Results

▶ Teacher Knowledge and Student Engagement

"Before taking the **QL** course, I never taught **QL** in algebra. After the course, I **taught QL every week**. I **learned what QL was and how to write lessons incorporating QL**" (Teacher).

"The main benefit of using **QL** is that **students are more interested** in the problems and **like solving** them since they **apply to their lives**" (Teacher).

Discussion

1. Teacher Education Course in Quantitative Literacy
2. More resources for Quantitative Literacy Instruction
3. Need for Quantitative Literacy Assessments
4. Connection to Standards needs to be Explicit
5. Technology in the Classroom

Examples of QL Lessons

- ▶ Movie Rental Costs
- ▶ America's Top Ten Video Games
- ▶ Carpet the Classroom
- ▶ The Values of Education
- ▶ Call Me, Call Me Any Anytime
- ▶ Choosing the Right Credit Card
- ▶ Business of Math: School Store Tasks
- ▶ The Cost of Having a Best Friend

Websites for QL

- ▶ Chance: <http://www.dartmouth.edu/~chance/index.html>
- ▶ Radical Math: <http://radicalmath.org/>
Articles, books, blog and links to websites.
- ▶ Mathematical Association of America: <http://www.maa.org/ql/>
Information and reports on practices and achievement.
- ▶ The National Numeracy Network: <http://serc.carleton.edu/nnn/index.html>
E-Journal, teaching resources, projects and events.
- ▶ National Council on Economic Education: <http://www.councilforeconed.org/about/>
- ▶ National Numeracy and Literacy Week: <http://www.nlnw.nsw.edu.au/>
- ▶ The Young People's Project: <http://www.typp.org/>
- ▶ Test Your Quantitative Literacy: http://voices.washingtonpost.com/x-equals-why/2009/02/test_your_quantitative_literac.html

References

- ▶ Gutstein, E. (2006). *Reading and writing the world with mathematics: Toward a pedagogy for social justice*. New York: Routledge.
- ▶ Gutstein, E. (2006). The real world as we have seen it: Latino/a parents' voices on teaching mathematics for social justice. *Mathematical Thinking and Learning*, 8(3), 331-358.
- ▶ National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.
- ▶ National Governors Association Center for Best Practices & Council of Chief State School Officers (CCSSO). (2009). *Common core standards*. Retrieved November 1, 2010, from <http://www.corestandards.org/FAQ.htm>



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