

# Math + Parents = Success in School

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## MATH AND PARENT PARTNERS (MAPPS)

Andrea Knapp, Ph.D.  
University of Wisconsin-Stevens Point

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# THE PROBLEM

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Minority and lower SES students have been found to be taught by teachers with lower mathematical knowledge for teaching (Hill, Rowan, & Ball, 2005).

- “the school systems where students struggled on the math sections [of the standardized test] tend to have the greatest student poverty and proportion of black and Hispanic students” (AJC, 6/5/08).
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# Goals: Create a community of adults who:

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- Have real learning experiences with mathematics
- Believe that their children can be successful at learning and doing mathematics
- Have strategies and activities for helping their children understand mathematics

# MAPPS Curriculum

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- Aligned with NCTM standards
- Developed through a NSF grant at the University of Arizona in with 4 pilot sites in the Southwest (Civil, Andrade, & Anhalt, 2000)

8-week Mini-course Title	NCTM Content Standard Addressed
<i>Thinking About Numbers</i> (offered two times)	Number & Operations
<i>Thinking About Fractions, Decimals, and Percents</i> (offered 3x)	Number & Operations
<i>Thinking in Patterns</i> (offered once)	Algebra
<i>Geometry for Parents</i> (offered once)	Geometry and Measurement
<i>Data for Parents</i> (offered once)	Data Analysis & Probability

# Research Questions

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- *Does parental involvement in a standards-based mathematics program such as MAPPS carried on at Title I K-8 schools improve student understanding and achievement in mathematics? Secondly we ask how might this improvement occur? In particular,*
  - *Do parents and teachers in MAPPS develop mathematical knowledge for teaching? If so, in what ways?*
  - *Do parents' and teachers' attitudes related to mathematics improve?*
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# What impacts student achievement?

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- ❑ Mathematical Knowledge for Teaching  
(Hill, Rowan, & Ball, 2005)
  - ❑ Parental Involvement  
(Goldstein & Campbell, 2000)
  - ❑ Family Structure  
(Supreme Court Commission on  
Children, Marriage, and Family Law)
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# Parent Involvement

## What do we know?

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- *"The evidence is consistent, positive and convincing: families have a major influence on their children's achievement. When schools, families, and community groups work together to support learning, children tend to do better in school, stay in school longer and like school more"* Henderson and MAPP (2002)
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# How did MAPPS address these achievement factors?

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- ❑ Parents, children, and teachers attend 8-week content-focused minicourses
  - ❑ Mini-course content aligned to state standards
  - ❑ Focus on fostering equitable relationships among parents and teachers
  - ❑ Community resources shared to strengthen families (ie. parenting classes, economic assistance, job training classes, GED program information, counseling opportunities, free literature)
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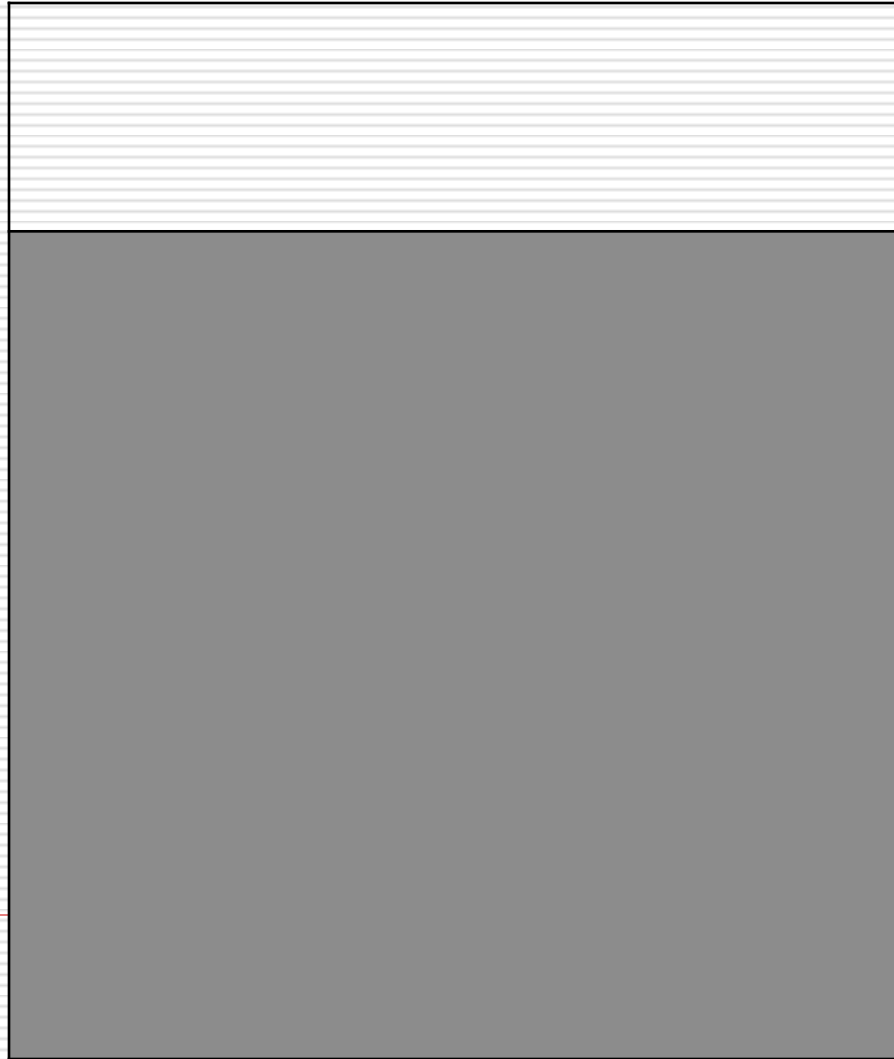
# Methods

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- 115 Children, 59 Parents and 33 Teachers from four Title I elementary schools attended 8-week minicourses
    - 2008-2011. 8 Mini-Courses presented.
    - Pre/post tests of parents, teachers; attitude surveys; 95 interviews; standardized test scores; free response test
    - Instruction provided by Mathematics Education graduate students.
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Estimate the percent of the square that is shaded.





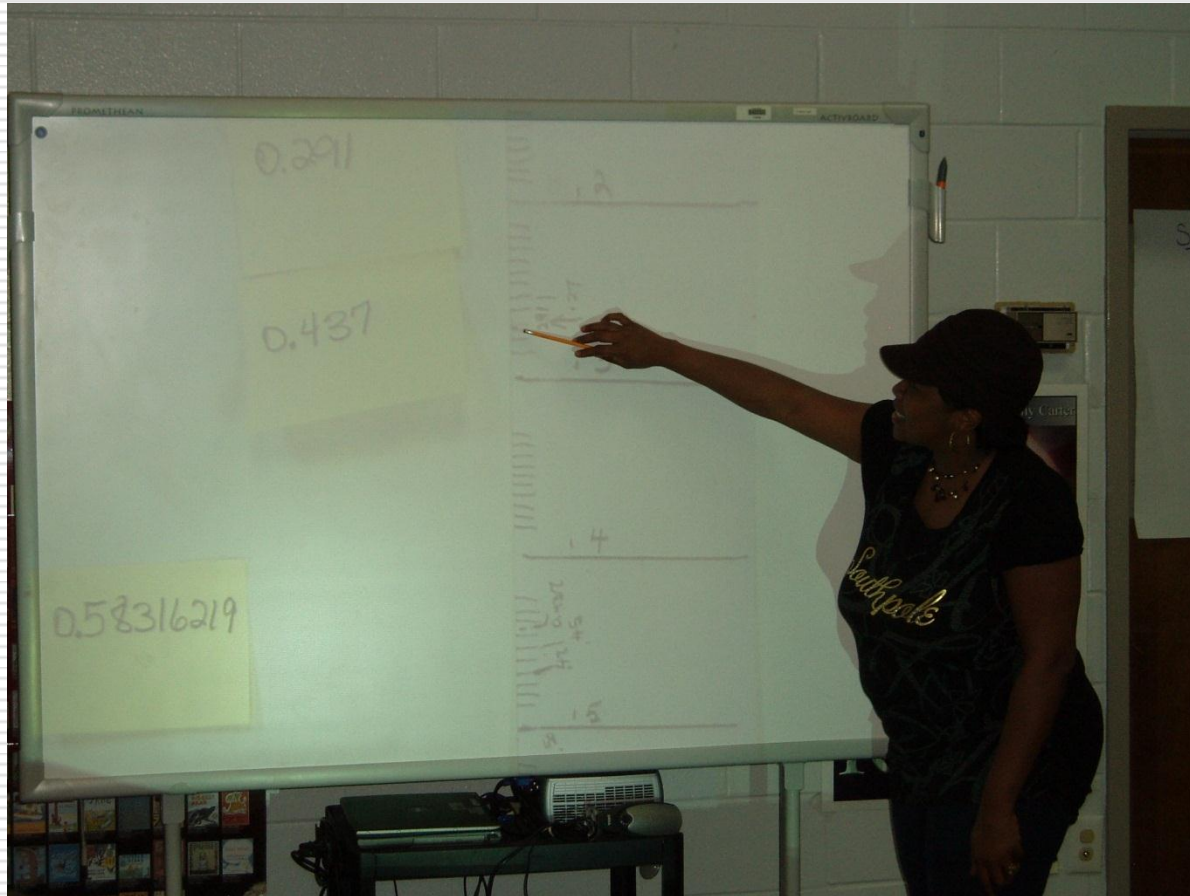







# Parent Presents Solution

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# Student activities

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- ❑ PreK-3<sup>rd</sup> grade students engage in hands-on math games and activities matching the parent content. 4<sup>th</sup>+ with parents.
    - MAPPS activities
    - Investigations in Number, Data, and Space
  - ❑ Skills preparation for standardized testing.
  - ❑ Homework assistance if needed.
  - ❑ Focus on strengthening parent-child relationships.
  - ❑ Focus on learning, not grades.
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# Students sharing solutions

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# Quantitative Results

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- ❑ MAPPS students taking at least one mini-course improved significantly on the mathematics portion of the CRCT ( $n = 39$ ,  $p < 0.001$ ). Comparison students *did not* improve significantly ( $n = 36$ ,  $p = 0.331$ )
  - ❑ Mathematical Knowledge for Teaching Test-Teachers improved significantly on the Number and Operations test when 1<sup>st</sup>-last compared. ( $n = 20$ ,  $p = .052$ )
  - ❑ Parent/Teacher attitude survey- Parent and teacher group improved significantly when 1<sup>st</sup>-last compared ( $n = 65$ ,  $p = 0.084$ ).
  - ❑ One school's math standardized test scores rose from 63% passing in 2008 to 81% passing in 2011.
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# Qualitative Findings from 95 Interviews

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Code	Freq
<b>Primary:</b>	
<i>Table 4. Aggregate Results from 95 Interviews</i>	
<b>Improved Parent-Child Interaction</b>	103
<b>Knowledge of Content and Teaching</b>	87
<b>Content Knowledge CCK(32) SCK(29) GLM (26)</b>	87
<b>Enjoyment of MAPPS</b>	75
<b>Valuing MAPPS</b>	75
<b>Learning Community</b>	43
<b>Student learning/achievement</b>	42
<b>Secondary:</b>	
<b>Confidence/Motivation</b>	31
<b>Continuing Education</b>	23
<b>Broader Impact of MAPPS</b>	18

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# Parental Learning of Math

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AK: Was there something that you didn't understand before that now you do understand?

Parent: Yes. Like I said before...some of the things that I was taught in my school at my time...I didn't real understand them for some reason I got them right. And she [the graduate instructor] just breaks it down, and then I understand it better...For example, one night we had this conversation: a half...what is the half of a quarter? ...And would you believe that for years I didn't know that half of a quarter...It is one eighth...And that you keep cutting it...ummm... $\frac{1}{2}$  of  $\frac{1}{8}$ ...And even on this test that I got...they asked me that question... $\frac{1}{2}$  of a quarter and I could answer...

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# Improved Homework Interactions

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- Parents are empowered to help their children with math homework

AK: OK. So, do you help him with his math homework sometimes?

Parent: Yes. But lately he doesn't want me to help him. Remember a couple of weeks ago I was telling you about the tenths and ten?

AK: Yes

Parent: And I did it for him but I was doing the tenths instead of ten and we got all of them wrong.

AK: Oh, no!

Parent: What ever time I try to help him, he says to me, "Mommy I don't think you know what you're saying." So I have a problem, right there. But now that I'm coming here, I can show him my notes and say this is what they taught me.

AK: So did you sit down and talk about that?

Parent: Yes, we did. ... the last time I came here I did um addition and then he took it to school and it was right. So. He's kind of trusting me a little now.  
(Both laugh) So that's good. I'm trying not to mess up again. (more laughter)

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# Improved Family Interactions

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- ❑ Parents report looking forward to “Math Night” with the family.
  - ❑ Homework time is becoming “Family Time”.
  - ❑ Families are playing MAPPS math games and activities at home.
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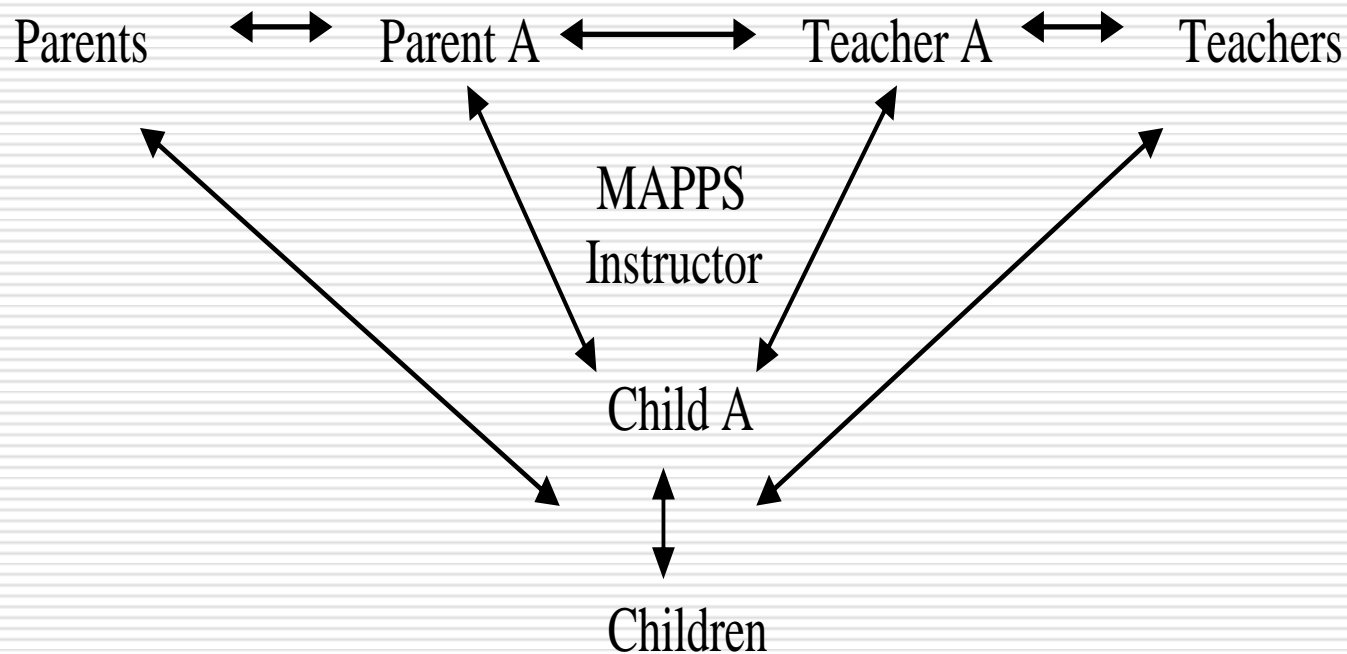
# Other Qualitative Results

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- ❑ Parent confidence with mathematics and with helping their children improved.
  - ❑ Parents enjoyed MAPPS, especially in that they were part of a learning community
  - ❑ Parent-teacher interactions improved.
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# MAPPS Learning Community: Position of power renegotiated

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“We all as a family are graduating tonight.”  
[www.math.arizona.edu/~mapps](http://www.math.arizona.edu/~mapps)

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