

Professional Noticing by Elementary School Teachers of Mathematics

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STEP: Studying Teachers Evolving Perspectives

- Studying the effects of sustained professional development focused on children's mathematical thinking
- Project Personnel
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Work of Teachers

Teachers must regularly

- focus their attention
- make sense of what they see
- decide how to respond

Professional Noticing

How professionals view and make sense of complex situations

Noticing Foundations

- Goodwin's (1994) *professional vision*
- Stevens & Hall's (1998) *disciplined perception*
- Mason's (2002) *intentional noticing*

Professional Noticing of Children's Mathematical Thinking

- Children think about mathematics differently than adults (Grouws, 1992; Lester, 2007)
- Instruction can be improved by attention to children's mathematical thinking (Wilson & Berne, 1999)

Foundations

- National reform documents (NCTM 2000; NRC 2001)
- Teaching with an inquiry stance (Ball & Cohen, 1999; Cochran-Smith & Lytle, 1999)
- Adaptive teaching (Sherin, 2002)
- Discovery teaching (Hammer, 1997)

Work of Teachers

Teachers must regularly

- focus their attention on
children's strategies
- make sense of
children's understandings
- decide how to respond
on the basis of children's understandings

Teacher Groups

N=132 (about 30 per group)

Practicing Teachers

(average of 15-16 years of teaching experience per group)

<i>Emerging Teacher Leaders:</i>	At least 4 years of sustained professional development
<i>Advancing Participants:</i>	2 years of sustained professional development
<i>Initial Participants:</i>	0 years of sustained professional development

<i>Prospective Teachers:</i>	Undergraduates enrolled in a first mathematics-for-teachers content course
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Components of Professional Noticing of Children's Mathematical Thinking

➤ **Identifying**

What 3 aspects of this video did you find noteworthy?

➤ **Describing**

Please describe in detail what the children said and did in response to this problem.

➤ **Interpreting**

Please explain what you learned about these children's understandings.

➤ **Responding**

Pretend that you are the teacher of these children. What problem or problems might you pose next?

**We have 19 children and 7 are hot lunch.
How many are cold lunch?**

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**We have 19 children and 7 are hot lunch.
How many are cold lunch?**

Most Details

“They made 19 individual tally marks in a row. Then, they counted out 7 tally marks and erased them. They counted the remaining tally marks by ones to get 12.”

**We have 19 children and 7 are hot lunch.
How many are cold lunch?**

Most Details

“They made 19 individual tally marks in a row. Then, they counted out 7 tally marks and erased them. They counted the remaining tally marks by ones to get 12.”

Few Details

“Annette and Maureen drew tally marks on the board. Tally marks are fundamental and basic.”

Describing Strategies

	<i>Prospective Teachers</i>	<i>Initial Participants</i>	<i>Advancing Participants</i>	<i>Emerging Teacher Leaders</i>

Describing Strategies

	<i>Prospective Teachers</i>	<i>Initial Participants</i>	<i>Advancing Participants</i>	<i>Emerging Teacher Leaders</i>

Describing Strategies

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Describing Strategies

	<i>Prospective Teachers</i>	<i>Initial Participants</i>	<i>Advancing Participants</i>	<i>Emerging Teacher Leaders</i>
Most Details	31%	44%	65%	79%
Few Details	69%	56%	35%	21%

Interpreting Children's Understandings

Interpreting Children's Understandings

Focus on Children's Understandings

"...The second pair has a simpler strategy than the first because they have to count out 19 tallies and then take away 7. They still need to make the amount. They can't hold it in their head yet like the first pair. Also they did not group their tallies into 5's which [would] allow them to keep better track of their numbers...."

Interpreting Children's Understandings

Focus on Children's Understandings

"...The second pair has a simpler strategy than the first because they have to count out 19 tallies and then take away 7. They still need to make the amount. They can't hold it in their head yet like the first pair. Also they did not group their tallies into 5's which [would] allow them to keep better track of their numbers...."

Alternate Focus

"I learned that it's important to allow students to use different tools to come up with mathematical problem solutions. ... I also learned that a math lesson can be so much more than just math. This teacher invited the students to a lesson in communication, listening, and respect in addition to subtraction."

Interpreting Children's Understandings

	<i>Prospective Teachers</i>	<i>Initial Participants</i>	<i>Advancing Participants</i>	<i>Emerging Teacher Leaders</i>
Elaborated Analyses of Children's Understandings	0%	3%	23%	46%
Analyses of Children's Understandings	19%	56%	48%	52%
Alternate Focus	81%	41%	29%	3%

Interpreting Children's Understandings

	<i>Prospective Teachers</i>	<i>Initial Participants</i>	<i>Advancing Participants</i>	<i>Emerging Teacher Leaders</i>
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What Have We Learned?

- Professional noticing is worthy of attention.
Identifying Describing—>Interpreting—>Responding
- Professional noticing of children's mathematical thinking can be learned, but requires *years* of professional development support.
 - Teaching experience alone is not enough.
 - Emerging Teacher Leaders showed more expertise than Advancing Participants.
 - Emerging Teacher Leaders still had room for growth.
- What are implications for professional development?