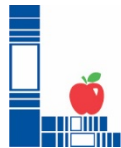




# Using Child Studies to Promote K-3 Teacher Noticing

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CYFS Summit, April 7, 2016



# Teacher Noticing

- Classrooms are complex settings. Teachers need to:
  - **Attend:** Decide what to attend to
  - **Interpret:** Make sense of observations
  - **Respond:** Make decisions based on analysis of observations
- Teacher noticing focuses on *how* teachers *attend* to, *analyze*, and *decide* in an educational setting.



# Importance of Teacher Noticing

- NCTM (National Council of Teachers of Mathematics, 2014, p.10):
  - Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.
- Focusing on students' mathematical thinking improves the quality of teaching and student learning and achievement (Carpenter et al., 2000; Crespo, 2000; Fennema et al., 1996; Jacobs et al., 2010; Sleep & Boerst, 2010; Swan, 2001; Wilson & Berne, 1999).



# Challenge in Teacher Noticing

- Teachers face two main challenges in noticing students' mathematical thinking (Cohen, 2004; Ma, 1999; Sherin et al., 2009):
  - Recognize interesting and rich mathematical ideas
  - Interpret these ideas
- PD programs are needed to promote teachers' abilities to notice students' mathematical thinking



# Approaches to Improve Teacher Noticing

- **Cognitively Guided Instruction (CGI)**
- **Video** (van Es & Sherin, 2002, 2008 )
  - Video Club
  - *Video Analysis Support Tool (VAST): Help teachers to analyze students thinking, teacher's role, and discourse.*
- **Classroom Artifacts** (Goldsmith & Seago, 2011)
- **Child Studies**



# Purpose of the Study

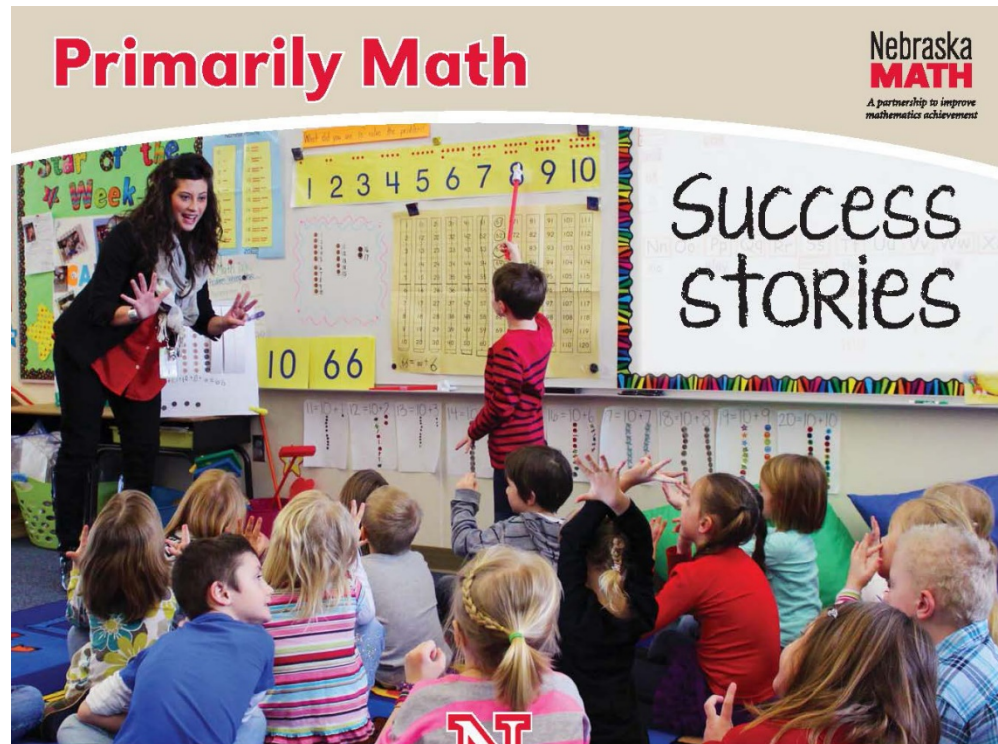
Examine a child study assignment in the context of a professional development program to better understand teacher mathematical noticing among K-3 teachers. We will describe:

- **The child study assignment**
- **The framework used/adapted to code teacher noticing**
- **Teachers' levels of noticing in the sample**
- **Challenges faced by teachers**
- **Usefulness of the child study assignment**



# Context of the Study

- **Primarily Math**
  - Elementary mathematics specialist program
  - 14 month, 18 credit hours
  - 3 math content & 3 pedagogy courses





# The Child Study Assignment

- Pick two children
- Observe for 8 weeks
- In-depth analysis of each child as a “learner” and a “doer” of mathematics:
  - Analyze child *strength and limitations* (with specific examples)
  - Connect analysis to *learning trajectories* and other research
  - Reflect on *future actions*





## Participants:

- 23 teachers from the first 3 cohorts
  - Teacher Mathematical Knowledge for Teaching (MKT)
  - Student-Centered Beliefs
- 100% Female
- Years of experience ( $11 \pm 8.4$ )

## Coding Process:

- Adapt coding framework
- Identify math topics
- Individual coding and reconciling



# Coding Framework

Adapted from van Es (2011):

Noticing Level	Description
<b>Level 1: Baseline Noticing</b>	Teachers only provided a general statement of what a child can or cannot do without providing any evidence to support claims.
<b>Level 1.5: Beginning Noticing</b>	Teachers provided very brief evidence that was not clearly described (e.g. showing student work, but not referring to this work in their text).
<b>Level 2: Mixed Noticing</b>	Teachers provided evidence (e.g. worksheets, dialog, pictures) to support their conclusions about student learning.
<b>Level 3: Focused Noticing</b>	Teachers not only provided evidence to support their claims, but also analyzed students' mathematical thinking.
<b>Level 4: Extended Noticing</b>	Teachers provided evidence, analysis, and future support for students or reflections of their own teaching practice based on observations.

## Level 1: Example

- He distinguishes one shape from another, but unable to define attributes of the shape.
- Katie has a good idea of number sense. From the beginning of the year, she was able to compare numbers, skip count by twos and fives, and could picture a mental number line in her mind.



## Level 1.5: Example

Kelly was initially confused about what a pattern was. She did not understand that a pattern needed to have a repeating part, so she lined up her collection of shapes randomly. When I asked her which part of her pattern repeated, she simply named each shape in the entire row. However, when I showed her an a-a-b pattern, by lining up 2 triangles and a circle, followed by another 2 triangles and circle, she was able to extend my pattern. Kelly continued to be somewhat confused when asked to verbalize the repeating section of a pattern, but gained confidence as the lesson continued. She successfully extended 6 patterns during independent practice that same day.



## Level 2: Example

From the beginning of school Ryan showed that he could easily subitize numbers 1-10 often seeing the 5 or smaller groups within the larger groups. I remember on one particular lesson the students were being asked to identify and circle groups of objects with a specific number of things in them for example 8. Ryan very quickly without counting circled two separate groups and when I asked how he knew that they were 8 he replied, “I see 6 here and 2 here and I know 6 and 2 are 8.” The other group he circled had a group of 5 and 3 when I addressed this, with just as much confidence Ryan said, “I know five plus three is eight.”



## Level 3: Example

Lauren's understanding of place value has really developed during this semester. She was asked to write a word problem using the equation  $24+59=83$ , she wrote "I have 20 dogs, 50 hamsters, 9 lizards and 4 fish. How many pets do I have?"

Although the word problem does not represent the given equation exactly, she understood the value of each digit was as she was writing the problem. I think that demonstrated a deep understanding of place value and how to break apart numbers.



## Level 4: Example

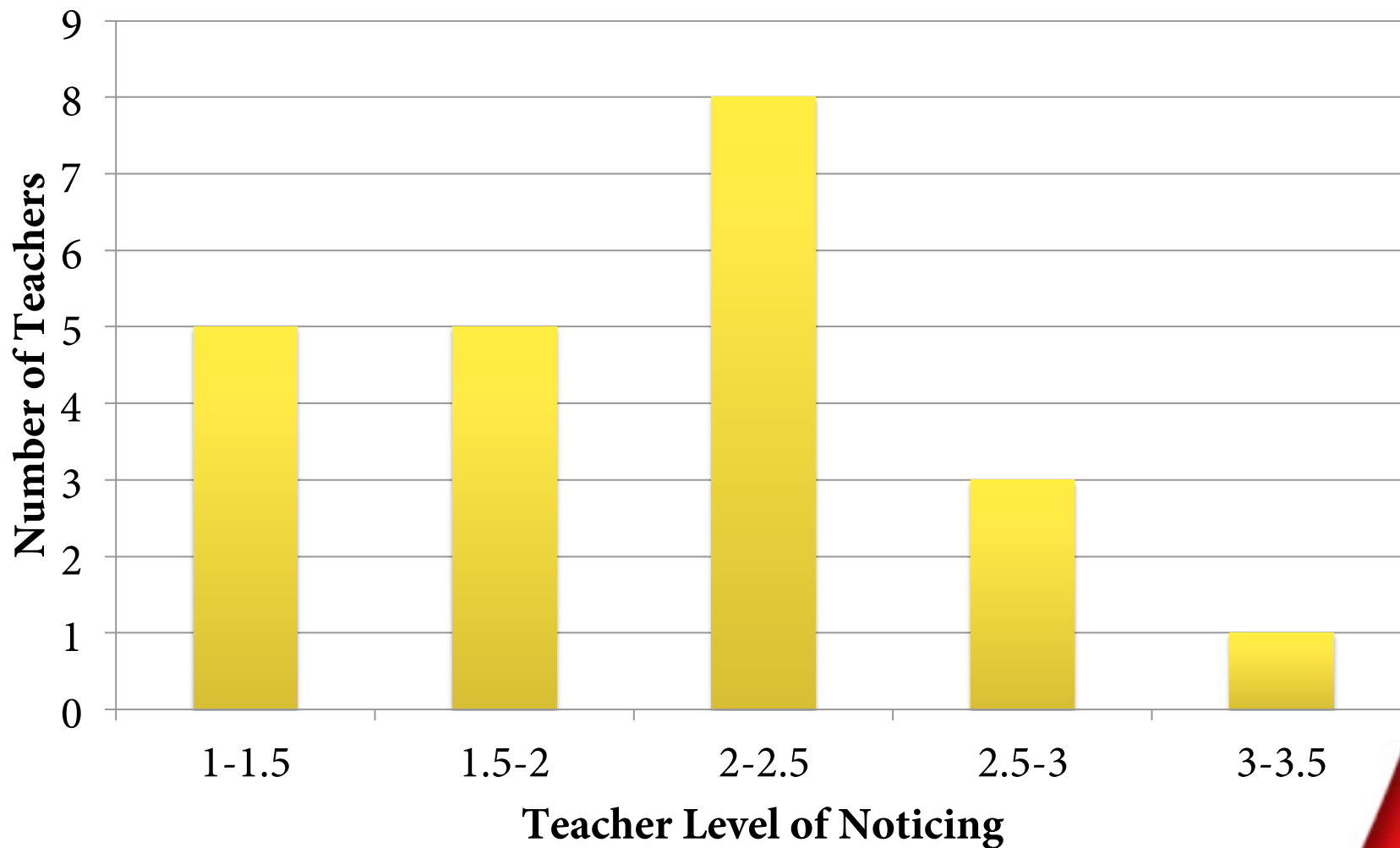
Having Jennifer do this task let me know that she is missing a big piece that will be needed all throughout our curriculum and Kindergarten math learning. Knowing that Jennifer is not my lowest math student, yet still does not grasp the concept; I need to become more purposeful in using the group of five dots in my number representations when doing examples with the students. In future lessons, I will be more intentional in asking the students to represent a number using manipulatives by showing a group of five when needed. Jennifer specifically needs more teaching on why five is such an important number in math and how we can use it to help us count. I will do this by relating it to the number ten, which becomes extremely important in our upcoming unit.





# Levels of Noticing

## Number of Teachers in Each Noticing Level



# Challenges Faced by Teachers

## Challenges:

- Competing Demands
- Collecting Artifacts
- Time Limitations

## Overcoming Challenges:

- Videotaping the observed children,
- Pulling observed children from the classroom/lesson
- Advice on the best way to take notes
- Ways to make themselves familiar with the observation process.



# Challenges: Errors



*Sarah:* I took 5 and wrote it there (pointing to top of column) then I took 12 and put it there (pointing to top of other column). Then drew circles to show the numbers. I crossed out 5 here (pointing to the 5 circles) and crossed out the 5 here (pointing to the 5 crossed out in the 12 column). These not crossed out circles are the answer.

*Teacher:* I didn't think her method was showing the mathematics in the problem and I didn't think she truly understood the story problem.

Teacher: I asked John to explain what makes a number even or odd. He did this in two ways with the number 27. He said, "Because, if you're counting by odd numbers, it only counts by the ones, if the first number is even, like 2, then if the ones number is odd, then it would still be odd. And the other way I know that is because, if you have 7 and you divide it, you'll have one left over." I liked the way he described this process in two different ways. It seems that he is thinking through the process as he explains it.



# Usefulness of the Child Study

We asked teachers to respond to three questions:

- Tell us about anything you learned from doing the Child Study that you believe still impacts your teaching now.
- How valuable was the Child Study assignment compared to other things you did as part of the Primarily Math program?
- Have you shared your experience of the Child Study project with your colleagues? If so, what and how did you share with them?



# Usefulness of the Child Study

- Use *observational skills* learned to better understand each individual student's mathematical strengths, weaknesses, and frustrations.
  - Make *instructional decisions* based on observations
  - Use knowledge of mathematical *learning trajectories*
  - Focus on the *whole child* and have a positive image of students' capabilities
- 
- Over 60% of the teachers considered the Child Study assignment as the most valuable piece or one of the most valuable pieces of Primarily Math.
  - About 75% of the teachers have shared their experience of the Child Study project with others.



## Recommendation for Teacher Educators

- Revisions to Child Study project
  - Add research literature about noticing
  - Add observation structures
  - Give time to practice observational tools
  - Reflect in groups after finishing project
- This is only one portion of NebraskaMATH
- Child Studies as an assignment is an effective vehicle for accelerating teacher noticing
- Noticing: teachers using knowledge in action



**THANK YOU**

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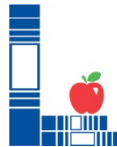
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