

Beginning Elementary Teachers Learning How To Enhance ELLs' Access to Mathematics: The Case Of The Clinical Interview

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Promising Math

Chicago, IL

October 13-14 , 2017

Kerri (I)

How would you continue the interview if you were in place of Kerri?

T: “Could you skip count by 3s?”

C: “3, 13, 23, 33, 43, 53...”

T: “Can you explain how you did that?”

C: “I counted by 3s, to 13, 23, 33 because when you start to 3s all of the 3s are here (pointing to 3s in the ones place on the hundreds chart) to start.”

T: “So you’re using the hundreds chart and you’re searching for what number...”

C: “3”

T: “So any number with the 3, that’s where you’re stopping and that’s the number you’re saying?”

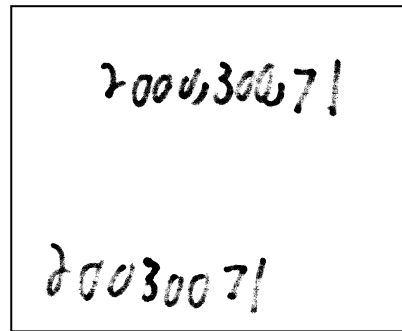
C: “yeah”

Jon (I)

How would you continue the interview if you were in place of Jon?

T: can you write the number “two thousand three hundred seventy-one”?

B: [writes the number “2000,300,71”]



2000,300,71

200030071

T: : can you write the number “two thousand three hundred seventy-one”? I want “one number” not “three numbers.”

B: [writes down “20030071.”]

Kerri (2)

After one semester

- Overall, I think I did a good job of pushing G to state his mathematical thinking in a clear way. I consistently asked, “how do you know?” “Can you show me?” “Why?” “What do you mean ____?” I also tried to restate his thinking or confirm his thinking by turning it into a question. I believe that this was particularly helpful for me to slow the interview down and assess his thinking.

Jon (2)

After one semester..

- “After you read the question the first time, what do you think this question is testing you about? “
- “why did you circle this information? Why do you think this information are key information?”
 - More questions ...still scripted

Abstract

This presentation will describe the use of a Clinical Interview method by early childhood mathematics student teachers. Drawing on both developmental psychology and mathematics education, we will report on a study of prospective and beginning teachers learning to conduct such an interview within the context of teacher education methods and research courses. Descriptions of how teachers develop and/or modify interview protocols to support their teaching of math to children whose first language is not English will be analyzed. We will emphasize findings on how this experience affects beginning teachers' questioning and lesson planning skills, and helps them understand and develop strategies to teach ELLs mathematics.

The Clinical Interview

- The Clinical Interview is Jean Piaget's invaluable methodological gift for both researchers and practitioners in development and education.
- “dialogue or conversation between an adult interviewer and a subject. The dialogue centers around a problem or task chosen to give the subject every opportunity to display behavior from which to infer which mental processes are used in thinking about that task or solving that problem.” (Hunting and Doig, 1997)

Clinical interview

*“... I became interested immediately in the way the child **reasoned** and the **difficulties** he encountered, the **mistakes** he made, his reasons for making them, and the **methods he came up with** in order to get to the right answers... Thus I engaged my subjects in conversations... with the aim of discovering something about the reasoning process underlying their right, but especially their wrong answers...”*

Jean Piaget

More Theoretical Background

- Developmental Psychology and Mathematics Education studies about **children's mathematical thinking**
- Calls for the **use of clinical interview by teachers in their classroom instruction**, as a powerful and necessary mean to help them meet with the current reform expectations and paradigm shifts (NCTM, 2000; Ginsburg 1997; Ginsburg, Lee and Pappas, 2016; Hunting, 1997; Long and Ben-Hur, 1991; Schorr and Lesh, 1998)
- **Training activities** were inspired by Ginsburg, Jacobs, and Lopez (1998), Hunting and Doig (1997) and Haydar (2002).

The Context: Graduate Program

- Graduate Program in Childhood Mathematics Education
- Four courses in mathematics including number theory and algebra, geometry, history of mathematics, discrete mathematics and probability and statistics
- A sequence of four mathematics education methods and research courses.
 - Teaching and Learning of Number Sense and Operations
 - Teaching and Learning of Fractions, Algebra, Geometry
 - Advanced Topics: Lesson Study, Classroom Mathematical Discussions, Growth Mindset, Analysis of mathematical tasks, Analysis of Student Work, Differentiation..
 - Action Research

The Clinical Interview In The Program

- First course: Rationale, history and role of the method in research and education; watch and analyze actual clips of interviewing; practice the skills and sub-skills for preparing and conducting clinical interviews; conduct first clinical interview related to children's number sense and they reflect about the experience and recommend steps for improvement.
- Second course: analyze various interview protocols from literature and videos about early algebra and geometry; conduct their second interview about children's algebraic or geometric thinking.
- Third course: conduct a set of clinical interviews and learn how to collectively analyze the data of multiple interviews for research and teaching implications.
- Fourth course: teachers conduct their action research
 - use clinical interviews as part of their data collection methods
 - One step further and study how they can use clinical interviews to improve specific teaching practices.

ELL's Considerations: Receptive vs Productive Language

- The ELP Performance Defined for...
- **RECEPTIVE** language—how ELLs process language to comprehend information, ideas or concepts
- **PRODUCTIVE** language—how ELLs use language to express information, ideas, or concepts

Framework for Creating Access for ELLs

- Challenging mathematical tasks
- Multimodal representation
- Development of mathematical communication
- Repeated structured practice

(Driscoll, Nikula & DePiper, 2016)

Three Reads

- Three Reads strategy uses three readings of the text in order to make sense of the material:
 1. The first read is to get a sense of the context in order to understand the “story” or big idea of the text. Students should not focus on the quantities or relationships between them during this reading.
 2. The second read is to discern the question or purpose of the text. The problem is read again in its entirety, looking specifically for information about what needs to be answered or done to be successful.
 3. The third read of the text is to gather important information that is needed to solve the problem or achieve the purpose of the task, such as specific quantities and their relationships.

(Driscoll, Nikula & DePiper, 2016)

Sentence Starters and Frames

- The amount of candies is represented by”
- The next time I make a diagram I will.....
Because

The Clinical Interview Protocol

1. Display a word problem mathematics task
2. Use appropriate language access strategies (e.g. Three Reads)
3. Give student time to work individually on creating a visual representation for the task
4. Consider how to support language production based on the created visual representation (e. g. Sentence Starters and Frame...)

The Clinical Interview Protocol

(Continued)

5. Display another mathematics task
6. Use appropriate language access strategies (e.g. Three Reads)
7. Give student time to work individually to complete sentence starter “I wonder...” about the sample of another student’s work.
8. Ask student to make sense of each step of the sample student’s approach
9. Have a conversation with your subject about the other student’s use of visual representation

Snapshot 1: Sarah's Protocol

- “Even though Beth is beginning second grade, in order to select appropriate tasks that she would need to solve independently and then discuss with me, I started by looking through first grade math problems that were posted on our website. I knew that **she isn't a strong math student** and I didn't want to overwhelm her and make her feel bad about her math skills while also placing **high demands on her verbal abilities**. However, I also didn't want to assume that she couldn't complete harder tasks and make her feel like the problems I presented were “babyish.” **I was careful to choose one that the right mix of problem solving, English reading and comprehension, and that would hopefully generate an interesting and rich discussion.**”

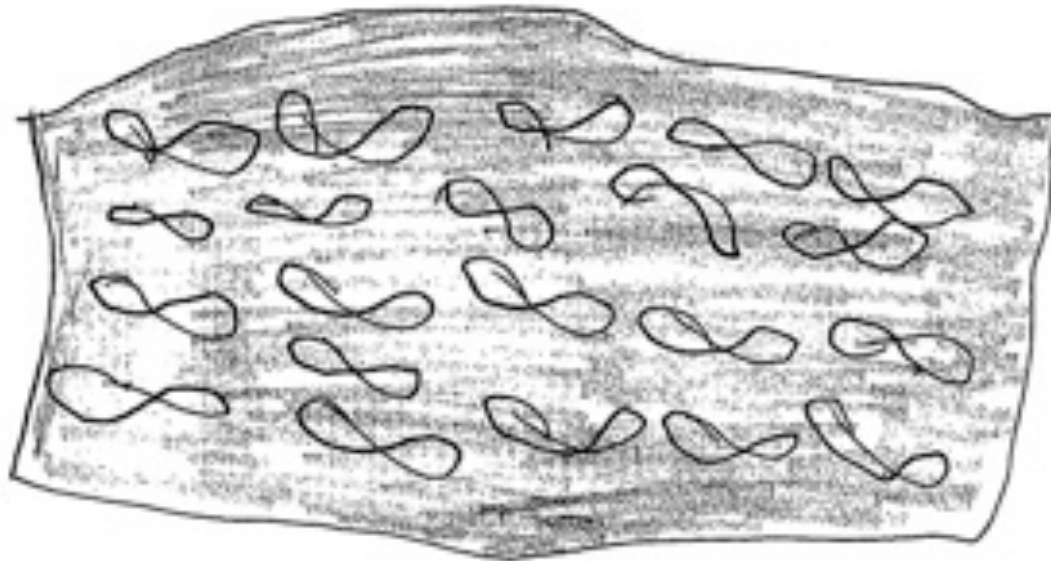
(Sarah- a beginning second grade teacher)

Snapshot 1: Sarah's Protocol

- “In terms of finding problems where she would need to analyze another student's solution, I wanted to choose an interesting problem that would have a solution that Beth could understand. I thought that although she may want to solve the problem herself first (before explaining the solution), she didn't have to do it and could understand what to do in the course of the discussion.I looked through the problems from Exemplars posted on our website and choose the “Fish Tank”**I chose two different solutions for each problem- one that I thought was a little easier and one that was more complex**, because I wanted to have options depending on how the interview went and how hard/easy it was for Beth to interpret. Finally, knowing that **concrete manipulatives** are important and helpful, I brought along some **Unifix** cubes, in case Beth needed them to represent her thinking concretely first”

Fish Tank Problem: Solution 1

(source: Exemplars)



"I put them all in the tank-5, 6, 9 fish.
I got 21 fish (counted 1, 2, 3...21)"
[How did you know to stop?]
"I counted to 21." A2

Fish Tank Problem: Solution 2

(source: Exemplars)

Count the fish. I can do a:
diagram



5 fish

6 fish

8 fish

"There are 19 fish that Erin
puts in the fish tank." A2

19

Snapshot 2: Jen's Interview

- Lets watch this short clip : (Jen, a 3rd grade teacher using the ELLs strategies in her interview)

Jen and the Three Reads

“During this interview, I, as well as E., recognized the usefulness of the Three Reads strategy and sentence frames. I particularly liked the fact that students are forced to reread the problem multiple times when using the Three Reads strategy. As a teacher, I always tell my students to reread the problem but they rarely do. Moreover, the Three Reads strategy gives students a lens for each read.”

Jen and E and the Three Reads

“In my opinion, students gain a better understanding of the problem following **a protocol** such as the one prescribed because **each read has a singular focus**. After E finished analyzing two student’s work samples I asked her how she felt about the Three Reads strategy and if she thought it helped her. E responded by saying “**yeah it was what the problem was about and the purpose, like what I need to do and what I need to do to solve the problem. And the information, it gives us...it could help us get the information of how much [unclear speech]**.” We both agreed that this is a strategy that we should continue to use in the classroom.”

Jen and E and the Sentence Frames

“It was pretty good because I could use this sentence, this makes sense because or this don’t make sense because.... That made me not need to think about my sentence and say it more smoothly and more faster.” At this moment E spoke like a true teacher and it was exciting to see that a student could recognize the purpose of a strategy even after the one experience with it.

Sentence frames

I'm wondering _____

I think _____

This doesn't make
sense because...

This makes sense
because...

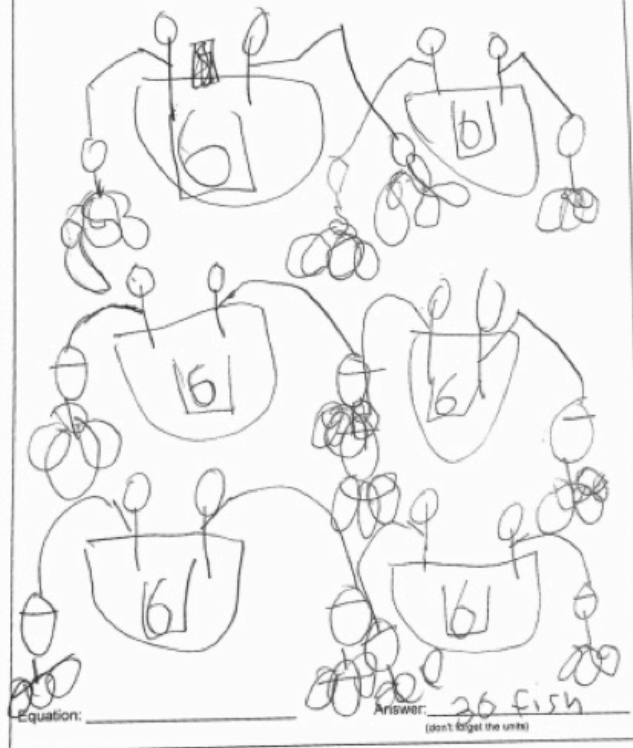
I solved the problem
by...

My ^{work} drawing shows...

Snapshot 3:Lyn's Use of Visual Representations

Story Problem: Some friends are camping near the shore. One friend suggests that they go fishing. Six boats are available at the campsite. Each boat holds two people and the friends are excited because that is exactly how many they need. The rule on this lake is that each person can catch only three fish. How many fish did the friends catch that day if each friend caught the limit? Show all your mathematical thinking.
First Read - CONTEXT The problem is about <u>Some kids want to fish and</u> <u>there are six boats</u>
Second Read - PURPOSE I need to find out <u>How many fish did the friends</u> <u>catch</u>
Third Read - INFORMATION I know <u>each person can catch only three fish</u> <u>There are some friends</u> <u>Six Boats</u> <u>Available</u> <u>each Boat have two seats</u>

Work space:



6 12 18 24 30 36

Lyn's Use of Visual Representations in Her Interview

Lyn: So how much fish do they have?

Student: We need to figure that out.

Lyn: You do need to figure it out. How are you going to figure it out?

Student: By counting them all.

Lyn: Go ahead!

Student: I think it's 31 fishes.

Lyn: How can we make sure?

Student: Because I counted all of them.

Lyn: Well I notice that over here you wrote, what is that? (pointing to all the 6's)

Student: Six. Oooh

Lyn: So, how can you figure it out, because your drawing is really great, but there may be a possibility you missed some. Do you think you could use the number six to help you?

Student: Yeah.

Lyn: Go ahead, how?

Student: By counting.

Lyn: How.

Student: Six.

Lyn: Are you trying to count by six? (student nods) You can write it down to keep track, so you don't have to keep it in your head. (student proceeds to write 6, 12, 18, 24, 30, 36)

Student: 36 fishes!

Other Themes

1. The challenge of listening and not teaching
2. The challenge of flexibility
3. Comparing and contrasting types of questions
4. Implications for the classroom
5. Experiencing mathematics education theories first-hand
6. Need and appreciation for Mathematical Knowledge for Teaching

Future Steps

- Meta-analysis and protocol fine-tuning
- Next Semester: 2-5 teachers will experiment with more EL strategies and various clinical interview protocols for their capstone action research
- Classroom research to study what and how any aspects from the PD and one-to-one setting travel to the general classroom setting.

To sum it up...

- The genius of Clinical Interview is that it is accessible and can be presented as an assessment or teaching method but its implication and impact can prove transformative. It can easily become a way of thinking about teaching and celebrating students' thinking.

Thank You.....

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