Experience the TN Instructional Math Coach Model

October 26–28, 2015
LEAD Conference

Presenters

• Victoria Bill, Resident Fellow, Institute for Learning

• Rebecca Few, Instructional Mathematics Coach
Bradley and Mitchell Neilson Elementary Schools
Murfreesboro City Schools

• Melissa Haun, District K-12 Math Instructional Coach
Loudon county schools
Panel Discussion

April Carrigan, Math Instructional Coach, Franklin Special School District
Melanie Shultz, Instructional Curriculum Coach, Mathematics Knox County Schools
Melanie Kosko, Instructional Curriculum Coach, Mathematics Knox County Schools
Raven Hawes, Instructional Curriculum Coach, Mathematics Shelby County Schools, iZone Schools
Pamela Harris Giles, Instructional Curriculum Coach, Mathematics Shelby County Schools

Goals of Our Session

Participants will

• learn about the collaborative project funded by the Institute of Education Sciences and
• study and discuss the TN Instructional Mathematics Coaching Model’s key practices of coaching:
  – Mathematical Learning Goals,
  – Depth and Specificity of Coach-Teacher Discussion, and
  – Evidence-Based Feedback.
Institute of Education Sciences—Collaborations Program

A collaboration between

• researchers from the Learning Research and Development Center (LRDC), University of Pittsburgh
• fellows from The Institute for Learning, University of Pittsburgh
• the TN Department of Education
• 32 mathematics coaches representing 21 districts and 65 partnering teachers

Effective Math Coaching

The effective math teacher coach must know the mathematics in depth and be able to show teachers how to set specific learning goals for a lesson, devise or select powerful tasks, analyze the knowledge—correct and misconceptions—that children are likely to bring to the task, and plan instructional conversations that are contingent on student responses and, hence, open to improvisation.

Teacher leaders support teachers via the following (though frequently interrelated) activities that include

• classroom observation,
• demonstration teaching,
• co-teaching and planning,
• advising, and providing feedback.

Lord, B., Cress, K., & Miller, B. (2003, September). *Teacher leadership as classroom support: The challenges of scale and feedback in mathematics and science education reform*. Newton, MA: Center for Leadership and Learning Communities, Education Development Center, Inc.

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**TN Instructional Mathematics Core Coaching Model**

TN Instructional Mathematics Coaching Model includes a set of tools and practices that can be used by coaches throughout the state to support teachers in their transition to more rigorous mathematics instruction.
Coach-Teacher Discussion Process

1. Goal and Task Selection
   - Coach & teacher set or clarify the mathematical learning goals
   - Coach & teacher communicate to select a high level task for the cycle
   - Coach & teacher independently work out solutions for task prior to planning conference

2. Pre-Observation Planning Conference
   - Coach & teacher schedule pre-observation planning conference within 24-48 hours before lesson
   - Coach & teacher mark specific pedagogical goals in service of the mathematical goal for the lesson and both commit to working toward the goals
   - Coach & teacher engage in a deep & specific discussion of the instructional triangle (mathematics content, student thinking & pedagogy)

3. Classroom Observation
   - Coach observes the teacher teaching the task
   - Coach & teacher gather evidence related to the mathematical & pedagogical goals

4. Post-Observation Conference
   - Coach & teacher schedule post-observation conference within 48 hours of observation
   - Coach & teacher analyze evidence to highlight the goals that were and were not accomplished
   - Coach provides evidence-based feedback that is contextualized within a larger framework of effective teaching
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Evidence-Based Feedback

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Goal Setting

Why Goals Are Important NOW

Today’s classrooms involve active student learning. Student-centered approaches to instruction may turn into

– anything goes,
– show and tells, and
– lack of connections.
Research on Teacher Planning

• U.S. teachers
  – focus on what students will “do” or on what content will be covered, and
  – do not use plans DURING teaching.

• Asian teachers
  – focus on how students’ thinking will unfold during the lesson and how to connect that thinking to the math goal of the lesson, and
  – use these plans as a resource during their teaching.


Goals: What Does the Research Say?

• Research in educational psychology talks about goals very broadly and their impact on motivation, metacognition, etc.

• Research specific to mathematics education and goals is in scarce supply. (Stein, in press)
Developing Consensus Among Mathematics Educators

Features of goals that make them good resources during classroom instruction:

• mathematical language
• specific language related to the underlying mathematical idea
• embedded in trajectories of how students learn mathematics

Establishing Clear Goals

Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.

Comparing Goals:
Using Benchmark Fractions to Compare Fractions

Analyze the goals below. How are they similar? Different?

<table>
<thead>
<tr>
<th>Performance Goal</th>
<th>Mathematical Learning Goal</th>
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<tr>
<td>Students will be able to compare fractions with unlike denominators and determine which is more, less, or if the amounts are equal to each other.</td>
<td>Fractions with unlike denominators can be compared with each other by using known benchmark quantities such as 1 or ½. Because the benchmark is a common amount, the difference between each fraction and the benchmark quantity can be compared.</td>
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Comparing Goals: Rate of Change

Analyze the goals below. How are they similar? Different?

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<td>Students will write a linear equation to represent a pattern.</td>
<td>The rate of change or the constant multiple, $m$ in the equation $y = mx + b$ is the amount that $y$ changes when $x$ changes by 1 unit. (adapted from NCTM) The constant, $b$, in the linear relationship $y = mx + b$ is the amount that does not change as the pattern grows and changes.</td>
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Comparing Goals: Adding Fractions with Like Denominators

Analyze the goals below. How are they similar? Different?

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<td>Students will be able to compare fractions with like size pieces.</td>
<td>Fractions with like denominators can be compared when the same whole or unit (area/region, set, linear/measurement) exists; because the size of the pieces is common, the number of pieces in each whole can be compared to determine which is greater or if there is the same amount.</td>
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The Purpose of Goals

Without explicit learning goals, it is difficult to know what counts as evidence of students’ learning, how students’ learning can be linked to particular instructional activities, and how to revise instruction to facilitate students’ learning more effectively. Formulating clear, explicit learning goals sets the stage for everything else.

Depth and Specificity:

Focus Discussion on the Instructional Triangle

Content

Pedagogy

Student thinking

Analyzing Practice

Read the coach-teacher discussions. (*Transcripts are provided.*) The discussions focus on mathematical learning goals.

What moves are being made by the coach to enhance and support the teacher’s understanding of the mathematical content and pedagogy?
Analyzing Practice

Whole Group Discussion
What about the discussions led to them being ones with depth and specificity?

Coach Moves: Supporting Deep and Specific Conversations

- Use manipulatives to help make sense of the mathematics.
- Feign confusion.
- Connect to other representations (a table, a graph).
- Inquire about students’ thinking.
- Ask teacher to say it another way or to add on to an idea.
- Contrast two different ideas (constant and constant multiplier, Accountable Task® community moves and Accountable Talk rigorous thinking).

* Accountable Talk is a registered trademark of the University of Pittsburgh.
Engaging in Role Playing: Having a Conversation with Depth and Specificity

Role-Play Process

• Arrange yourself into triads.
• One person will be the coach, one will be the teacher, and one will be the observer.
• Plan for a deep and specific conversation for 10 minutes. When we call time, the coach will engage the teacher in a deep and specific conversation for 10 minutes. The observer should script the conversation in order to report back what was said.
The Bags of Candy Task

John has 4 bags of candy with 5 pieces of candy in each bag. Mary has 5 bags of candy with 4 pieces of candy in each bag. Make a diagram and write an equation showing each person’s bags of candy. Explain who has more candy and how you know.

Reflecting on Our Conferences

- Listen as your observer shares questions asked by the coach.
- Discuss with each other ways in which the discussion was deep and specific and what about the conversation made this possible.
- Be prepared to share a move made by your coach to deepen the discussion of the learning goal.
Reflection on the Role Play

• In what ways was the conversation deep and specific?
• What moves were used by the coach to support the discussion?

Why Should We Focus Discussion on the Instructional Triangle?

- Content
- Pedagogy
- Student thinking
Evidence-Based Feedback

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Coach Feedback and Guidance

According to the Principles and Standards for School Mathematics, “collaborating with colleagues regularly to observe, analyze, and discuss teaching and students’ thinking” is a powerful form of professional development. Such collaboration can be supported with feedback that involves debriefing after some kind of teacher work. Coaches recognize that providing classroom teachers with some kind of commentary on their practice is an essential part of their job. Feedback follows the event (e.g., an observation, an occasion of co-teaching, or a study group meeting) and takes this activity or practice as the basis for a professional exchange.


Two Cases of Coaching

Watch the two post-lesson conferences between coaches and teachers.

Read the coach’s Evidence-Based Collection Tool in the participant packet. The tool includes

- the teacher’s goal statements;
- the evidence cited by the coach;
- the questions in the Evidence-Based Press column; and
- Next Steps.

In what ways are the ideas on the Evidence-Based Collection Tool used by the coach? (Not all goals are included on the video clip.)
Two Cases of Coaching

Much appreciation in advance to the following coaches and teachers for sharing their practice:
1. Tammy Johnson and Tony Womac
2. Raven Hawes and Marvin Jones

Sharing “Noticings”

Watch each video of an evidence-based discussion. Make “noticings” related to the post-lesson conferences.
Discussing Evidence

The challenge, as a number of the teacher leaders in our study put it, was to construct feedback in a way in which it might actually be heard and acted upon.

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What evidence did we have that the teacher(s) heard the feedback?

Coach Feedback

Feedback holds the greatest potential for moving beyond the straightforward sharing of teacher leader experience, toward substantive critical commentary on the work. **Appropriate feedback makes it possible for learners to assess their actual work against their intended goal and, with proper guidance, to even advance their understanding of concepts.**

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Did the teachers have opportunities to compare their actual work against the intended goal?
Effective Feedback

“Effective feedback must answer three major questions asked by a teacher and/or by a student: Where am I going? (What are the goals?), How am I doing? (What progress is being made toward the goal?), and Where to next? (What activities need to be undertaken to make better progress?) These questions correspond to notions of feed up, feed back, and feed forward. How effectively answers to these questions serve to reduce the gap is partly dependent on the level at which the feedback operates. These include the level of task performance, the level of process of understanding how to do a task, the regulatory or metacognitive process level, and/or the self or personal level (unrelated to the specifics of the task). Feedback has differing effects across these levels.”

Experience the TN Instructional Mathematics Coaching Model

PARTICIPANT PACKET

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Deep and Specific Coach-Teacher Discussions

- Work privately to read the transcripts. All of the transcripts include a deep discussion of content.
- What moves are being made by the coach to enhance and support the teacher’s understanding of the mathematical content and pedagogy?

Comparison of Fractions: Grade 3

Task Description: The students are to compare $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{6}$ and determine which amount is the greatest, and they are to justify their claim.

Mathematical Learning Goal: Students will be able to compare the fractions and justify that the whole must be the same, but when the whole is partitioned, the greater the number of pieces the smaller the size of each piece. (e.g., $\frac{1}{3}$ is larger than $\frac{1}{5}$ because 3 pieces is fewer pieces than 5 pieces of the same whole, so therefore thirds are larger than fifths.) Students will use the symbols < and > with models to explain their reasoning.

Transcript Segment

Coaching Moves

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| 1 T:  I want students to determine that one fraction is bigger than the other even when they have different denominators, not just being able to see if they’re the same, but discovering the differences in them.  
| 2 C:  Tell me how you will have students compare $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{6}$ so you can figure out what they are thinking right away.  
| 3 T:  I could have students make a drawing, but then they make the whole different sizes and end up with the wrong answer.  
| 4 C:  So give them a cut out rectangle and tell them the rectangle represents the candy bar in each situation and ask who has more candy, the person with $\frac{1}{4}$, $\frac{1}{5}$, or $\frac{1}{6}$? Let’s fold these and show the pieces. What might you see or hear from students?  
| 5 T:  The students will say sixths are smaller than fifths and fourths.  
| 6 C:  Great so they will make this claim. What question can you ask to find out the reason why $\frac{1}{6}$ is smaller than $\frac{1}{4}$?  
| 7 T:  Tell me why sixths are smaller than fifths and fourths? They will say, “Sixth are smaller than fourths because there are more pieces.”  
| 8 C:  Keep going, press for more because they still did not say why. They gave you a fact there are more pieces. One figure is cut into sixths and one whole is cut into fourths. What is the reason why one is greater than the other?  
| 9 T:  I see what you mean. They will say “Sixth are smaller pieces than fourths because the same whole is cut into more pieces so the size of the piece is smaller.”  
| 10 C:  Can you ask them to show you how they know one is more than the other? This will allow you to mark $\frac{1}{6}$ has a smaller area than $\frac{1}{4}$ because there are more pieces in a whole divided into six pieces than a whole divided into four pieces. So a sixth has a smaller area than a fourth.”  

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Meaning of Expressions: Grade 7

**Task Description:** Students are to determine the number of square cubes in a figure and generalize the pattern over several stages of the figure’s growth. The first building in a sequence has five arms each with one cube and one cube in the very center of the figure. In stage two, one more cube is added to each arm. In stage three, another cube is added to each of the five arms.

Building 1   Building 2     Building 3

**Mathematical Learning Goal:** I want students to link the terms of an expression to the pattern found in a repeating visual model so that they come to understand the meaning of a constant multiple/rate of change as it relates to the independent variable and the constant as an aspect of the context that remains the same from one stage of the building to the next (which is the y-intercept). By identifying the meaning of the rate of change and the constant, students will be able to write expressions that match the context.

### Transcript Segment

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<tr>
<td>T:</td>
<td>I want students to see that we can write 5n-4. I said 5 times 2 because there are two cubes in each of the five arms for the second building. So, that’s five times two. Then minus 4.</td>
</tr>
<tr>
<td>C:</td>
<td>What do you think students will say n represents?</td>
</tr>
<tr>
<td>T:</td>
<td>n is the building number. I just talked about the 2nd building. The building number then times 5 for the 5 arms, take four away.</td>
</tr>
<tr>
<td>C:</td>
<td>But why take away four? What will they say is the reason we are subtracting four?</td>
</tr>
<tr>
<td>T:</td>
<td>They will say, “It is the second building because each arm has two cubes.”</td>
</tr>
<tr>
<td>C:</td>
<td>What expression will they write?</td>
</tr>
<tr>
<td>T:</td>
<td>5 x 2 and this counts the one in the middle five time.</td>
</tr>
<tr>
<td>C:</td>
<td>I’m confused, the second building has 6. (points to building he has built) Why is it 6 not ten?</td>
</tr>
<tr>
<td>T:</td>
<td>Ah, I’m sorry it is 6.</td>
</tr>
<tr>
<td>C:</td>
<td>How did you count the cubes?</td>
</tr>
<tr>
<td>T:</td>
<td>I did 2, 4, 6, 8, 10. Ah, I counted the one in the middle four extra times. So I have to say minus four. This is where the minus four comes from because I said it four times extra. So it is 5n – 4 because one cube on each of the five arms is counted four extra times, so minus four is needed.</td>
</tr>
<tr>
<td>C:</td>
<td>So what is the constant?</td>
</tr>
<tr>
<td>T:</td>
<td>− 4 the constant because it is subtracted each time.</td>
</tr>
<tr>
<td>C:</td>
<td>What is the constant multiple? Let’s look at the information in a table.</td>
</tr>
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<tr>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
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</table>

| T: | Really helps to see the growth of 5. |
| C: | Where do you see this is the table? |
| T: | 1 and 5 more make six cubes for the 2nd stage of the building, 6 and 5 is 11 cubes for the third stage of the building, 11 and 5 is 16 cubes for the fourth stage of the building. |
| C: | If you ask students why is this happening and you ask them to show you with the cubes, what will they say? |
| T: | Hmm, good question. Is that the one cube added to each of the five arms. There is the 5n again. |
| C: | So what is the constant multiple? |
| T: | 5 is the constant multiple because you multiply each stage of the building by 5 and then subtract 4. |
Use of Benchmark Fractions to Make Comparisons: Grade 4

Task Description: Students are to compare $\frac{3}{4}$ and $\frac{4}{6}$ and explain which fraction is greater and how they know.

Mathematical Learning Goal: I want students to use benchmark fractions to compare two fractions. If they learn to use benchmark fractions, there is less calculation and more reasoning involved because benchmarks help students reason about the magnitude of a fraction (how much more or how much less a fraction is in relationship to a benchmark quantity). Students will name how much greater than or less than $\frac{1}{2}$ each fraction is and compare only the differences from $\frac{1}{2}$.

Transcript Segment

81 C: How are you gonna get students to explain and show you that $\frac{3}{4}$ is greater than $\frac{4}{6}$?
82 T: One of the ways I kind of thought they might do this is by decomposing, like they--
83 what we were saying was decomposing $\frac{4}{6}$ cause to try to compare it to like breaking
84 down $\frac{4}{6}$ to $\frac{3}{6}$ plus $\frac{1}{6}$ to equal $\frac{4}{6}$.
85 C: Mm-hmm, do you think they will use the benchmark of half or $\frac{3}{6}$ to make a
86 comparison between $\frac{3}{6}$ and $\frac{2}{4}$ on their own?
87 T: Well they know $\frac{3}{6}$ and $\frac{2}{4}$ are both half. And then taking the $\frac{1}{4}$ and saying that that’s
88 smaller than $\frac{1}{4}$ because sixths are smaller than fourths and you have one of each,
89 the fourth and the sixth and figuring it out that way, but I don’t know – I mean that
90 could be a possible solution.
91 C: Wait I’m confused. Say more about this. Can the students use a number line to
92 compare $\frac{3}{4}$ to $\frac{4}{6}$?

Coaching Moves

93 T: Well if they see $\frac{3}{6}$ is half and they know that $\frac{2}{4}$ is half, the $\frac{2}{4}$ (points to the number
94 line) and a fourth left over.
95 C: Mm-hmm – so we think the students will create two number lines, one with sixths
96 and one with fourths. But how can we use the visual of the number line to ensure
97 you meet your goal of using the benchmark of $\frac{1}{2}$ to compare fractions.
98 T: Well, I want them to say, each one has one extra piece past a half. So now the
99 pieces that are left over, the $\frac{1}{4}$ is compared with the $\frac{1}{6}$. They can see that $\frac{1}{4}$ is greater
100 than $\frac{1}{6}$.
101 C: Great reasoning, but how can we ensure that this is going to be what they focus on?
102 T: Oh, right. Maybe we can have the number lines pre-labeled with 0, 1 AND $\frac{1}{2}$ so they
103 are forced to think about $\frac{3}{6}$ and $\frac{2}{4}$ as $\frac{1}{2}$ automatically. Then I can ask them how they
104 know which is greater just by saying which is more, $\frac{1}{4}$ or $\frac{1}{6}$. The marking of $\frac{1}{2}$ means
105 they’ll have to talk about that. We can even ask if having $\frac{1}{2}$ on the number line was
106 important.
107 C: That would really push on the use of the benchmark.
Pedagogy for Supporting Student Learning

A. Use of a Representation
   • Make a table
   • Make a graph
   • Link to context
   • Make use of manipulatives
   • Write an equation

B. Connection Between Representations

C. Use of Assessing and Advancing Questions

D. Selecting and Sequencing Solution Paths

E. Accountable Talk® Moves

F. Talk Formats
   • Turn-and-talk
   • Think-pair-share
   • Brainstorming or making observations

® Accountable Talk is a registered trademark of the University of Pittsburgh.
Giving It a Go!

- Arrange yourself into triads.
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- Plan for a deep and specific conversation for 10 minutes. When we call time, the coach will engage the teacher in a deep and specific conversation for 10 minutes. The observer should script the conversation in order to report back what was said.

The Bags of Candy Task

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Two Cases of Evidence-Based Feedback

Watch the two post-lesson conferences between coaches and teachers.

Read the coach’s Evidence-Based Collection Tool in the participant packet. The tool includes

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- Next Steps.

In what ways are the ideas on the Evidence-Based Collection Tool used by the coach? (Not all goals are included on the video clip.)

Much appreciation in advance to the following coaches and teachers for sharing their practice:

1. Tammy Johnson and Tony Womac
2. Raven Hawes and Marvin Jones
### Coach-Teacher Discussion Cycle Evidence-Based Collection Tool

**Coach:** Tammy Johnson  
**Teacher:** Tony Womac  
**Date:** April 2015  
**Lesson/Task:** Salty Pretzels Task  

<table>
<thead>
<tr>
<th>Mathematical &amp; Pedagogical Goals Set in the Pre-Lesson Conference</th>
<th>Evidence (Noticings)</th>
<th>Evidence-Based Press</th>
<th>Next Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Math Goal:</strong> Add + subtract mixed numbers with like denominators working alone and in groups</td>
<td>11 - 9 ¼ = 2 ¼ → I wonder how we could correct this misconception? Heard kids say that you just add the numerators and denominators stay the same. Most did not. I only saw one student who added denominators.</td>
<td>I wonder how working to finish the problem in the group might have helped their understanding?</td>
<td>Use smaller numbers, model/manip. regroup kids so no dominate with non dominate.</td>
</tr>
<tr>
<td><strong>Math Goal:</strong> Compare mixed numbers or improper fractions</td>
<td>I didn’t see anyone who converted first. I saw someone with 7 ¼ but was not sure what to do.</td>
<td>I wonder how a model might have help her understand? I wonder how much understanding kids have of the relationship?</td>
<td>Use models</td>
</tr>
<tr>
<td><strong>Math Goal:</strong> Decompose fractions (mixed numbers)</td>
<td>I didn’t see anyone saw 1 student who decomposed the wholes and fractions. I heard one kid say they decomposed but it was incorrect term.</td>
<td>I wonder what would have happened if we have showed them this. I wonder if the know mixed can be broken up?</td>
<td>Model again Manipulatives (Make groups of 4 and add + subtract)</td>
</tr>
<tr>
<td><strong>Pedagogical Goal:</strong> The teacher will use accountable talk moves to engage students in productive math talk during the summary of the lesson</td>
<td>I heard you use repeat each others thinking 3 times. I didn’t hear agree/disagree or add on. Add on restate I I agree/disagree</td>
<td>I wonder how the engagement and discussion could have benefited from using the other 3 accountable talk moves.</td>
<td>More accountable talk. Cards to remind. Cues for kids with agree/disagree cards on desk. Post-it note with questions.</td>
</tr>
</tbody>
</table>
Sharing “Noticings”

Watch each video of an evidence-based discussion. Make “noticings” related to the post-lesson conferences.

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<th>Coach-Teacher Discussion</th>
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<tr>
<td>Tammy Johnson and Tony Womac Hamilton County School District Grade 3</td>
<td></td>
</tr>
<tr>
<td><strong>Task:</strong> Students are solving the Salty Pretzels Task. Students will add mixed fractions and determine if the amount is more than or less than 2 cups.</td>
<td></td>
</tr>
<tr>
<td><strong>Mathematical Learning Goal:</strong> When adding or subtracting mixed fractions, the whole numbers can be added, and then the fractions or an improper fraction can be added or subtracted if a common denominator exists.</td>
<td></td>
</tr>
<tr>
<td><strong>Pedagogical Goal:</strong> The teacher’s personal goal was to use <em>Accountable Talk</em> moves to engage students in productive math talk during the summary of the lesson.</td>
<td></td>
</tr>
</tbody>
</table>
Coach-Teacher Discussion Cycle Evidence-Based Collection Tool

Coach: Raven Hawes  Teacher: Marvin Jones
Date: Lesson/Task: Swimming Pool Task

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<thead>
<tr>
<th>Mathematical &amp; Pedagogical Goals Set in the Pre-Lesson Conference</th>
<th>Evidence (Noticings) I saw/heard . . .</th>
<th>Evidence-Based Press I wonder if the teacher/the students will/can . . . How would . . .</th>
<th>Next Steps What will you do tomorrow? What are the next steps?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedagogy Goal Minimize private-think time to 5-6 minutes.</td>
<td>I noticed that after 5 minutes of private-think time you interrupted and asked the whole class questions. You also provided additional information to get students thinking in the right direction.</td>
<td>I wonder if this was adequate time for all learners.</td>
<td></td>
</tr>
<tr>
<td>Pedagogy Goal Ask questions to probe students get at their prior knowledge.</td>
<td>I noticed you asking a variety of question to get the students thinking in the right direction. What do I need to know about the Olympic-sized pool? What information do we need to write an equation?</td>
<td>I wonder if the students were confused once you said that the $y$-was needed because of the $y$-intercept.</td>
<td></td>
</tr>
<tr>
<td>Pedagogy Goal and Mathematical Goal Derive an equation from the table and from the written description.</td>
<td>I did see, in whole-group, where the students were able to come up with the equations for both pools.</td>
<td>I wonder if the students would have made more connections if were to “mark” crucial bits of information as they occur throughout the discussions.</td>
<td></td>
</tr>
<tr>
<td>Mathematics Goal Number sense – students are able to make sense of the numbers in context of the problem.</td>
<td>I heard the students explain the meaning of the 17,000 in the equation of the smaller pool.</td>
<td>I wonder if the students would have been able to consider the start of the Olympic-sized pool with a moment of private think time at that point.</td>
<td></td>
</tr>
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## Sharing “Noticings”

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| **Raven Hawes and Marvin Jones**  
**Shelby County Schools**  
**Grade 7** | |
| **Task:** Swimming Pool Task: The smaller pool has 17,000 gallons in it. It fills at a constant rate of 500 gallons per hour. When he begins filling the Olympic-size pool 5 hours later, he begins to record data on the amount of water in each pool.  
**Mathematical Learning Goal:** Students are able to make sense of numbers in context of the problem.  
**Pedagogical Goal:** Minimize private think time to 5–6 min. Ask questions to probe students to get at their prior knowledge and derive an equation from the table and from the written description. | |

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