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| **Nevada Math Series**  Session 4 |

Why Problem-Solving and Reasoning?

*Building Math Skills—Problem Solving and Reasoning*

**Generate a list of the benefits of teaching problem solving and reasoning as well as the challenges teachers may face in doing this effectively.**

Excellence in Problem Solving and Reasoning

*Building Math Skills—Problem Solving and Reasoning*

Criteria of Strong Instruction that Involves Problem-Solving and Reasoning

* Rooted in **real-world problems and questions** through a **hands-on collaborative process** with teachers and peers
* Includes opportunities for students to **develop questioning, research and communication skills**
* Includes some kind of **guidance and structure** — not just a project or aimless play, but exploration and manipulation that has a purpose or a problem to solve
* Includes both **content and math practice standards**

Excellence In Action

*Building Math Skills—Problem Solving and Reasoning*

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| CRITERIA | EVIDENCE FROM CLIP |
| Rooted in **real-world problems and questions** through a **hands-on collaborative process** with teachers and peers |  |
| Includes opportunities for students to **develop questioning, research and communication skills** |  |
| Includes some kind of **guidance and structure** — not just a project or aimless play, but exploration and manipulation that has a purpose or a problem to solve |  |
| Includes both **content and math practice standards** |  |

Geometry

*Building Math Skills—Problem Solving and Reasoning*

**Key Ideas**

* **Shape characteristics/attributes**: Noticing what makes each shape different, like knowing that a triangle has three points
* **Matching**: Recognizing common elements of shapes and matching pairs (circles, triangles, and squares)
* **Positioning shapes**: Understanding how shapes fit together and can be combined, like completing a puzzle

**Video Notes**

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| *How can we apply the ideas of building problem solving/reasoning skills into geometry?* | *What connections can you make to the math standards?* |
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Measurement

*Building Math Skills—Problem Solving and Reasoning*

**Key Ideas**

* **The size, length, height, and weight** of people or objects: Like when they describe a baby sibling as “short” and themselves as “tall”
* **The concept of capacity**: As they “fill” and “empty” a container with sand or water
* **The idea of distance**: Whether a favorite toy is “far away” or “close by”
* **The idea of time**: Concepts like before, after, later, soon and “in a minute.”

**Video Notes**

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| *How can we apply the ideas of building problem solving/reasoning skills into measurement?* | *What connections can you make to the math standards?* |
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**Create a Developmental Progression chart here:**

Practice

*Building Math Skills— Problem Solving and Reasoning*

**Plan**

* **Imagine** you are modeling a short activity focused on building problem-solving and reasoning skills through measurement or geometry (your choice of what key idea to explore!) for a teacher.
* Use the guided process below to **write** **one activity and at least three related question you could ask of students to build problem-solving and reasoning.**

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| What **age** of students are you working with? |  |
| **Goal**: What problem-solving skills do you want to build with students? |  |
| **What better supports building this skill?** Circle measurement or geometry as your choice. | Measurement Geometry |
| Select a **key idea** within the topic you chose. |  |
| **Describe the activity** you would plan for this.  Be sure to address: What problem will students work to solve? |  |
| How do you expect students to **collaborate, research, communicate, ask questions** during this activity? |  |
| What THREE **questions will you ask during the activity to build problem-solving and reasoning skills**? |  |
| What **standards** does this connect to? |  |
| How does this connect to **real-life**? |  |

Check your planning using the 4 criteria and standards.

Criteria of Strong Instruction involving Problem Solving and Reasoning (use this also to guide your feedback for your partner)

* Rooted in **real-world problems and questions** through a **hands-on collaborative process** with teachers and peers
* Includes opportunities for students to **develop questioning, research and communication skills**
* Includes some kind of **guidance and structure** — not just a project or aimless play, but exploration and manipulation that has a purpose or a problem to solve
* Includes both **content and math practice standards**

**Partner Feedback**

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| Glow |  |
| Grow |  |

Leader and Coach Planning

*Building Math Skills— Problem Solving and Reasoning*

**Take the next several minutes to create a plan for how you will share this content with the center staff that you support as a leader or coach.**

* When will you deliver this content to your staff or the teachers you work with?
* How will you deliver content to your staff or teachers you work with? (One whole-group two-hour professional development? Smaller groups? Smaller chunks of time? Direct facilitation vs. small group planning?)
* How will you support your team or the teachers you work with in implementing problem solving and reasoning activities? What tools will you create and provide them with?
* What challenges do you anticipate your staff or the teachers you work with may have with this content?

Observation Practice

*Practice: Observing for Problem Solving and Reasoning*

Collect data focused on the **Owning the Learning and indicators 1b and 2c** for teacher and student actions.

Rating on the Rubric Reminder

*Practice: Observing for Problem Solving and Reasoning*

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| HOW TO RATE FOR OVERALL PERFORMANCE |
| 1. Decide on your rating for each indicator. 2. Consider the ratings for all the indicators under a particular competency (i.e.. Essential Content). 3. Using your evidence and indicator ratings, assign an overall rating to that competency: Ineffective, Approaching Developing, Developing, Proficient. 4. Write 2-3 evidence statements that support your overall rating. 5. Repeat for each relevant competency. |

How would you rate what we observed on the rubric? Does this teacher’s instruction exemplify what we identified as critical for problem solving and reasoning?

What is emerging to you as a primary area of development? (*You don't have to fully commit to your area of development quite yet - more evidence is coming!)*

Sharing a Key Lever

*Practice: Observing for Problem Solving and Reasoning*

**To effectively *Share the Key Lever*:**

* Share concrete evidence from the observation that illuminates key lever you want the teacher to develop:
  + Show a video of the moment in the class that clearly demonstrates the problem. “What are the students doing? What are you doing?”
  + “Do you remember what happened in class when \_\_\_? [Teacher IDs what happened; coach provides data if teacher cannot]
  + Use the observation evidence to explain what the teacher needs to improve.
* Share rubric data, where appropriate. Share your assessment of their rating, using the rubric language to deliver the feedback.

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| **The Process** | |
| **Key Lever** |  |
| **Evidence** |  |
| **Rubric Data** |  |

Key Lever Feedback

*Practice: Observing for Problem Solving and Reasoning*

**Listen/Look For…**

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| *Share the Key Lever* | * Referring to a hard copy of the rubric * Incorporating more data from your observation notes * Telling the story of the ratings, i.e. “You’re minimally effective here because …” * Being direct and supportive with your feedback * Narrowing your focus to fewer development areas * Clearly stating the indicator of the rubric you’d like the teacher to improve * Including a rationale for why this key lever is the most important thing to develop * Setting a clear goal for teacher improvement |

**Partner Feedback**

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| Glow |  |
| Grow |  |

Exit Ticket

*Practice: Observing for Problem Solving and Reasoning*

* How confident do you currently feel in determining and sharing a key lever with your teachers for math? What is coming naturally? What will you need to continue to develop?
* How will you ensure you further your understanding of the math observation rubric before our next session?

Next Steps

*Closing*

**Prior to our next Leadership Series training:**

**Teacher Observations:**

* Conduct at least 3 teacher observations using the observation rubric (you should be rating on competencies 1, 2 and 3). Observe teachers during any time of the day to get an understanding of when/how math skills are being developed in their classroom.

**Building Problem Solving and Reasoning Skills:**

* Implement the teacher training content on Problem Solving and Reasoning with at least one small group of teachers (approximately 5 teachers) prior to our next training.
* Collect exit tickets at the end of the Problem Solving and Reasoning training session and bring those with you to our next training.
* Before and after the training: Observe a small group of teachers who will participate in the training (3-5) to assess if and how problem solving and reasoning development is being implemented in their classrooms before and after the training you provide. Complete the graphic organizer and bring it to our next training.

**Reminder:** Complete training for Number Sense and collect exit tickets and before/after observation data as well!

**Ongoing:**

**Teacher Observations:**

* Prioritize time in your schedule to conduct observations of teachers each week. Enter those teachers’ ratings into the observation tracker.