Lesson 1 Using Visualization, Acting Out, and Retelling to Interpret Problem Solving Situations

**Brief Overview:** In this lesson, students will use visualization, acting out and retelling to interpret problem solving situations. The focus is interpretation of the situation rather than coming up with a solution. As you plan, consider the variability of learners in your class and make adaptations as necessary.

**Prior Knowledge Required**

- Familiarity with the common addition and subtraction problem solving situations from first grade (p. 183 in 2011 MA Curriculum Framework for Mathematics)
- Ability to identify what is happening, or the actions, that occur in a problem solving situation
- Read (or provide access to text),
- Identify the unknown in a situation

**Estimated Time:** 1 hour

**Resources for Lesson:**

- Poster or chart paper,
- Story problem situations for each group,
- Picture to represent the story problem that teacher reads to class.
- Poem: *My Neighbor’s Dog is Purple* by Jack Prelutsky or other poem for visualization
Unit: Problem Solving using Addition & Subtraction Situations
Content Area/Course: Math grade 2

Time (minutes): one hour

Lesson #1: Using visualization, acting out, and retelling to interpret problem solving situations

By the end of this lesson, students will know and be able to:

Retell problems in their own words.

Essential Question addressed in this lesson:

What does it mean to understand a problem?

Standard(s)/Unit Goal(s) to be addressed in this lesson:

2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g. by using drawings and equations with a symbol for the unknown number to represent the problem.

SMP1 – Make sense of problems and persevere in solving them
SMP2 – Reason abstractly and quantitatively
SMP3 – Construct viable arguments and critique the reasoning of others.

Anticipated Student Preconceptions/Misconceptions:

Students may not understand that certain key words or phrases (e.g. “all together,” “more”) indicate addition. Students may not understand what “action” means in the context of a word problem. Help them think about this as “what is happening” in the problem.

Instructional Resources/Tools:

Poster or chart paper, word problems for each group, picture to represent the word problem that teacher reads to class.
Instructional Tips/Strategies/Suggestions:

Certain key words or phrases limit students’ thinking regarding how to approach a problem, e.g. difference can be solved as a missing addend equation. Focus on interpreting the story as a whole rather than the use of key words.

Pre-Assessment:

Complete a picture walk (preview a math-related story by looking at and discussing the pictures and making predictions about the events in the story). Have students do this with a partner by taking turns. Look for students who are able to articulate the events in the story based on the pictures. In this pre-assessment, students are making sense of quantities and relationships and representing situations by decontextualizing tasks into numbers and symbols (SMP 2 Reason abstractly and quantitatively)

What students need to know and are able to do coming into this lesson (including language needs): Read (or provide access to text), visualize, identify the unknown in a situation

Lesson Details

Lesson Opening
Activate Prior Knowledge (formative assessment): 10 minutes
1. Inform students of the day’s objective: Today we will see what it means to understand word problems and how reading helps us with math.
2. Before we talk about this skill, let us talk about what we know about addition and subtraction. Let us talk about and list the words we associate with addition (then subtraction). Scribe student answers on chart paper or on the board. If an answer does not make sense, probe with questions about why the student associates that word with addition (or subtraction).
3. Now we are going to think about how sometimes words tell math stories. We call these story problems or word problems. Sometimes we have number problems like 3 + 2 = 5 and sometimes we have word problems. When we try to solve a word problem we need to understand what is happening, or the action, in the problem, and use both our reading and our math skills to solve it. One of the reading skills we can use in math is visualizing. What does visualizing mean (mental images)? How do we use it in reading? How can we use it in math?
During the Lesson

Focus Lesson – “I Do”: 10 minutes

For this lesson, you will need a copy of Jack Prelustsky’s poem, My Neighbor’s Dog is Purple. It can be found at: http://www.scholastic.com/teachers/sites/default/files/posts/u65/pdfs/my_neighbors_dog_is_purple.pdf. Today I will read a poem and model how I visualize it by drawing a picture that represents the mental images I made in my head (Teacher can use any book or poem to use to model visualization).

1. Model the visualization and thinking using words from the poem to explain his/her drawing.
2. Ask students to find the sentences that they believe the teacher used to draw his/her picture.

Guided Instruction– “We Do It “15 minutes

Now we are going to listen to a story problem. I would like everyone to listen to the problem. Our focus today is not solving the problem instead; it will be seeing the action of the problem. Who knows what the word action means? After students share their thoughts, say: the action in the problem is what is happening in the problem. We will act it out and see the “action” of the word problem.

I would like everyone to close his or her eyes and listen to the word problem. I will say it twice. Remember we will not be thinking about an answer, only the action, or what is happening, in the word problem. Read slowly:

It is recess for Grade 2. Ms. Smith’s class is lined up at the swings. There are 8 children in line at the swings.
Mr. Rogers’ second grade class comes out to play too. They decide to play on the jungle gym. There are 9 children on the jungle gym. How many children are at the playground?

Now let us open our eyes. What did you visualize when I was reading the word problem? What did you see in your mind? (If students have a hard time visualizing the problem, guide them with questions while their eyes are still closed: Can you see the swings in your mind? Can you see Mrs. Smith’s class of children at recess? How many can you see? Can you see Mr. Roger’s students coming out to play at the jungle gym? How many children are at the jungle gym? etc.

Can anyone retell the word problem in his or her own words? Have students think-pair-share (t-p-s) what they think is happening in this word problem.

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Teacher Note: Establish that think-pair-share means that they will have 1-2 minutes to think and write or draw quietly about the problem. After that time has passed, they will turn to a partner and share their thoughts for 1-2 minutes. Each will take a turn speaking while the other listens. The listener should paraphrase or comment on the speaker’s explanation. Students should be explicitly informed that at this stage they should use a critical eye to examine their partner’s work and comment on any misconceptions they see, whether on their part or on the part of their partner. They should use evidence from what the partner said or showed in writing to support their comments. The listener then takes a turn speaking and the roles reverse. This should take 3-6 minutes in total. Times may vary depending on the task at hand. A written product showing what was discussed may or may not be required depending on the task. Pairs may be called upon to share with the whole group. This think-pair-share protocol provides practice for SMP 3—Construct viable arguments and critique the reasoning of others.

If this is being established for the first time with students, the teacher should model what this looks like by demonstrating what a conversation around a mathematical problem looks like. If another adult is not available for this role play, the teacher could show and comment on math work. After the teacher has modeled this and students have practiced, have a student pair model for the class also. Emphasis should be placed on listening, commenting using mathematical reasoning, rephrasing what your partner said, being polite, and respectfully agreeing or disagreeing. Partners should rotate so students have the opportunity to discuss mathematics with a variety of fellow students. A chart with sentence stems could help students who are new to or have difficulty with these conversations. This is also a nice scaffold for English Language Learners. Periodically monitor conversations to make sure students are following these guidelines. As students become comfortable with these types of conversations, they may occasionally be called upon to share their conversation with the whole class.

1. Popcorn share (choose a few students around the room to share answers) short answers about something they visualized. Then choose one or two students to retell the word problem for the whole group.

2. After the retell, select children to act out what is happening in the word problem. Have the children look at the list of words they listed for addition. Which word best describes what happens in this word problem?

3. Show the picture you made in your head while visualizing this word problem.
Collaborative “You Do It”: 15 minutes
Say to students, You will now work within your group to create a picture representation of a word problem. Each group will receive a word problem and as a group, you will decide how to represent what is happening in the word problem with a picture or pictures. Everyone should read the word problem silently first. Then one member of the group will read the word problem out loud, but softly. Next, as a group you will discuss and decide how best to represent what is happening in the word problem. Make sure everyone has a turn to contribute to the ideas of the group about how to represent the word problem with a picture. Each group will be responsible for representing their thinking on one poster. Each group will share their work with the class.

Share/Reflection – 10 minutes
Bring the class back together. Have each group share their poster with the class. Ask students to explain how their picture represents the problem solving situation. Have them explain how visualization helped them with this activity and make comparisons between visualizing a mathematical story/word problem and visualizing a story they have read (What is different? What is the same?).

Through this sharing, students make sense of the meaning of the task and find an entry point for the task (SMP 1 - Make sense of problems and persevere in solving them; SMP3- Construct viable arguments and critique the reasoning of others)