

Handout 3

Math Problem Solving Lesson: Grades 1 and 2 (Standards 1, 2, 3, 4, and 5)

Ms. Lee's has thirty first- and second-grade students in her class all of whom are recipients of free or reduced lunches, and over ninety percent of them are designated English learners. In this lesson, the students are learning about representing and solving problems involving addition and subtraction. Ms. Lee begins by connecting the focus of the lesson to what the students have previously learned. She discusses the specific learning goal for the lesson, as well as the criteria that she and the children will use to decide if they are meeting the goal. This is what she has written on the white board:

Today, we are learning how to represent our understanding of a one-step word problem and to use a strategy to solve the problem.

The criteria that will guide your learning are:

- I can identify what the word problem is asking me to do.
- I can use a math strategy to help me solve the problem (I can use appropriate math tools to help me, if I need them).
- I can give an explanation of my thinking using accurate math vocabulary.

Then she introduces what she terms an “active engagement strategy” where students are involved in peer conversations about a given story problem. This is the problem they discussed.

Jorge collected 730 stamps. After giving some stamps to his friends, he had 645 stamps left. How many stamps did he give to his friends?

Guided by Ms. Lee, the children discuss the problem and identify the action and problem (in her terms, “the who?” and “the what?”). The children cease their conversations and Ms. Lee begins a mini-lesson, by discussing with the students what the problem requires them to do, and then she invites them to consider how the problem can be solved. After a period of quiet thinking time, she asks specific children to share with the whole class different ways in which the problem can be solved and reminds them about the success criteria they previously discussed. As individual students share their problem-solving ideas, their peers have opportunities to provide feedback to them about their method and their reasoning. Ms. Lee uses these exchanges during the mini-lesson to gauge the

S1:I2:L4

Teacher makes connections explicit between previously learned and/or new concepts and skills

S4:I1

Teacher and all students understand what students are learning, why they are learning it, and how they will know if they have learned it

S1:I1

Teacher activates all students' initial understanding

S3:I4

Teacher structures the classroom environment to enable collaboration, participation, and a positive affective experience for all students

S3:I3

Teacher assists all students to use existing knowledge and prior experience to make connections and recognize relationships

S5:I1:L4

Teacher fully aligns assessment opportunities with clearly specified learning goals and

level of student understanding about representing and solving the problem. Following this, Ms. Lee asks the students to “turn and talk” in twos or threes to discuss other ways they might be able to represent and solve the problem.

performance criteria

While they are engaged in discussion, she visits each group in turn to listen in and to ask clarifying questions, such as “What is the action in the problem?” and “Did the second number increase or decrease? Why?” This is yet another opportunity for her to assess student understanding. Based on what she has heard in the student discussions, she decides she needs to clarify which quantity in the problem is the unknown. She then returns to the lesson goal and success criteria and once again reviews them with the children to make sure they are clear about their intended learning.

S3:I1

Teacher provides opportunities for extended, productive discourse between the teacher and students and among students

S5:I4:L4

Teacher effectively adapts his/her actions for all students in response to evidence presented and/or generated

After the mini-lesson, students work independently on representing and solving problems. Here is the problem they are asked to solve.

S3:I2:L4

Teacher effectively structures opportunities for all students to use varied representations that successfully engage student thinking, and successfully support their understanding of emerging/developing concepts and/or their acquisition of skills

S2:I1:L4

Teacher engages all students with relevant and substantive tasks that effectively support deep learning of subject-matter content

Rico had a bag of marbles. He gave ____ marbles to his younger brother Cruz. Now he has ____ marbles left. How many marbles did Rico have to start with?

(5, 13) (43, 52) (227, 332)

The numbers in parentheses represent differing levels of knowledge about place value. Different students work on different numbers in the problem, depending on their current level of understanding of place value as determined by Ms. Lee. Students are also involved in selecting the numbers they will work on by deciding on a “just right” number. Ms. Lee and the children have developed a set of criteria that they use to choose numbers that are at the right level for them – not too easy and not too challenging. Of course, Ms. Lee monitors very closely the choice of numbers, but finds that the students have effectively determined what is right for each of them.

S4:I2:L4

All students actively engage in reflection on their learning status, directly related to learning goals and performance criteria in well-structured opportunities during the lesson

S2:I2:L4

Teacher provides tasks at the appropriate level of challenge for every student, effectively enabling each student to advance his/her learning of subject-matter content and processes

While the children work independently, Ms. Lee engages in one-on-one conferences with a number of students. These student conferences have been predetermined based on previous discussions, observations of student activity, and review of work products. During the conference, she reviews their work products and asks strategic questions designed to probe their thinking and encourage them to consider how they solved problems and also to justify their approach, for example, she asks “Why did you select that strategy to solve the problem” or “Do you think this is the most efficient way to solve the problem? Why?”

S5:I3:L4

Teacher consistently plans on-going learning opportunities based on substantial, current evidence of all

S5:I2:L4

Teacher structures multiple and varied opportunities to generate evidence of all students' learning during the lesson

Ms. Lee responds to each of the students based on the evidence she has elicited from the students' work and her interaction with them. Her responses include clarifying a student's explanation, a targeted teaching point to either clear up a misunderstanding or move a student to a higher level of understanding, and specific feedback to a student to provide a hint or cue that the student can use to progress. She writes the feedback on a sticky note so the student has it for reference when returning to independent work. For example, for one student she writes, "Can you think of a number sentence that would match your visual representation?" and for another she writes, "I'd like you to think of another strategy and compare it with this strategy to decide which one is more efficient and why." At the end of the conference, she asks the students to evaluate themselves in relation to the success criteria and discusses with them their self-assessment. In these conversations, she asks the students to explain why they think they have met the goal, or why they haven't and what help they think they need. She values the students' own judgments and finds them a useful source of insight into how they think about their own learning. In each of the conferences, she makes notes about what was discussed, what her response was, and where she thinks the student needs to go next in learning.

S4:I2:L4

All students actively engage in reflection on their learning status, directly related to learning goals and performance criteria in well-structured opportunities during the lesson

Toward the end of their work time, the children complete a self-reflection about their learning that day. In this reflection, they record any challenges, successes, and what they think they need to do next. The lesson ends with a plenary session where Ms. Lee chooses an example of two strategies she has observed, which she turns into a teachable moment for all students.

At the end of the day, Ms. Lee considers the information she has gained from several sources of data during the lesson: the students' work products (their representations and problem-solving strategies) the feedback students provided to each other during the mini-lesson, her interactions with each small group during the mini-lesson, her conference notes, her observations, and students' own reflections on their learning. She uses the evidence she has from the students to make decisions about what levels students have reached, where she needs to begin her math instruction the following day, and which students she will meet with one-on-one. She also reflects on the targeted instruction she provided during the lesson to decide if she needs to revisit some of these teaching points with the whole class, with small groups or with specific individuals.

S5:I4:L4

Teacher effectively adapts his/her actions for all students in response to evidence presented and/or generated

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