# 1

# Show and Tell
## An Overview

### What Do We Mean by "Show and Tell"?

Do you remember show-and-tell from your childhood? Having children bring a treasured object to school to share with their classmates is a time-honored tradition in many early-childhood settings. When originated, it represented one of the few times that students initiated learning in the classroom. By selecting the item to be shared, the students decided what their classmates would talk about.

Although it continues to offer an opportunity for young children to develop their language skills, within today's busy classrooms, this activity is often limited to a brief viewing of a selected treasure. Further, the focus is on one child only, and at times, competition about who has what is unwittingly instilled. In contrast, in this book, we use *show-and-tell* to refer to a way of teaching and learning. Ideally, as an instructional approach show-and-tell offers the benefits of the traditional activity without some of its built-in limitations.



Show and Tell: Representing and Communicating Mathematical Ideas in K–2 Classrooms

A focus on showing and telling—the representation and communication of thinking—encourages children to construct ideas as they make sense of their world. It requires children to organize ideas for themselves and to present information to others. It provides them the opportunity to listen to and to learn from each other, to gain respect for one another as they participate in a learning community.

Unlike the traditional show-and-tell activity, which occurs on a schedule, in our conception of this approach children show and tell throughout their learning experiences. Rather than being limited to situations in which a single child presents to the whole class, children represent their ideas alone, in pairs, or in small groups. Similarly, they can express their thinking when working independently with the teacher or when interacting with a group of other students.

When the class works as a whole, the focus is not on any one child, but on the exchanges among the group. The discourse emphasizes student-to-student interactions. The teacher may facilitate or monitor the conversations, but she does not dominate or control the discussion.

This type of show-and-tell is particularly important to the teaching of mathematics. Too often, learners of mathematics are passive. They are given rules or examples that they can replicate, but often they are unable to use their mathematical skills to solve real-world problems. They rarely create mathematical ideas for themselves, but rather they depend on the expert—the teacher—for direction. Over time, they may come to believe that they cannot do mathematics themselves.

Recent reform efforts have emphasized a more active approach to the study of mathematics. As a result, many classrooms have adopted a hands-on exploration of mathematical ideas. Such activities are not sufficient, however, for the development of deep-seated knowledge and skills.

To make the most of mathematical inquiry, students must grapple with ideas, formulate questions, make and test conjectures, describe their methods, and justify their conclusions. These are the expectations when a show-and-tell approach is made central to the teaching and learning of mathematics.


Show and Tell: Representing and Communicating Mathematical Ideas in K–2 Classrooms

## How Do We Represent and Communicate Ideas?

Think of the route you take from your home to the local supermarket or to a friend's house. Can you visualize the right- and left-hand turns in relation to one another? Can you count the number of lights? Do you know the names of the streets? If you had a guest who needed directions, would you draw a map or provide written directions? If you were the one receiving the directions, which would you prefer? What if you purchased something that came with those famous words: "Some assembly required"? Would you attend most to the written instructions or to the drawings?

Some people have a strong preference for either visual or verbal directions. They might put together a bookcase from pictures provided, never reading one word of the written instructions. Others might never look at pictorial instructions, preferring to follow the accompanying written steps. Many people combine verbal and visual suggestions. In fact, written directions often contain references to visual cues, as in an instruction such as "Turn right after the big red sign." Similarly, maps often contain verbal information such as the names of streets or the mileage relative to a particular road. If asked, many people would probably choose to be given a combination of verbal and visual instructions, even though they themselves might be unable to provide them.

Research has provided sustained confirmation that the human ability to process verbal or visual information improves with practice. Recently, it has been suggested that the areas in our brains that perform such functions become enlarged as we increase our use of them, much like our muscles expand with exercise. Scientists studied a group of London taxicab drivers and found that after just two years on the job, the areas in the drivers' brains responsible for storing mental maps of places (the hippocampus), grew larger.

Schools tend to emphasize the verbal processing of information. Yet if our students are to be able to have the fullest understanding of ideas and to develop the widest access to learning, they need opportunities to develop a variety of ways to represent and communicate information. They should be able to

use gestures, drawings, models, words, symbols, dramatizations, and manipulative materials to convey ideas. Through this variety, a deeper and broader understanding develops.

## How Does the Show-and-Tell Approach Unfold in the Classroom?

Here is an example from a first-grade classroom. It is December, so the students are familiar with classroom expectations.

The students have been engaged in writing workshop. Pencils, papers, and folders are scattered about the classroom in a flurry of ongoing activity. The class stops to clean up before going to lunch, but three pencils remain on the floor. The teacher chuckles as she takes note of them, formulating her plans for math time. She points the wayward pencils out to the children and says, "It seems that we often find pencils on the floor during cleanup. Let's see if we can solve a problem about this after lunch."

When the children return from lunch, they gather in a circle around the easel. Together, they read the problem, written on a large piece of paper:

> I was cleaning up the classroom the other day. I found 5 pencils on the floor under the table. I found 6 more pencils next to the window. How many pencils did I find?

The problem (adapted from Kliman and Russell 1998) is reread as a whole class, to help emergent readers become familiar with the text. Then the teacher facilitates a conversation about the problem.

TEACHER: WHO CAN TELL US ABOUT THIS PROBLEM?
BILLY: It's about pencils.
KERRI: I found some pencils this morning.
NICK: We found them in different places.
SELENA: You have to put them together.
TEACHER: WHAT DO YOU MEAN BY THAT?
SELENA: You have to put the ones from the table and the window together.
TEACHER: DO YOU FEEL READY TO WORK ON THIS PROBLEM?

As heads nod, the teacher distributes a copy of the problem to each student. There is plenty of white space on the paper, as only one problem is presented. The children disperse about the classroom. Some work alone, some work in pairs, and some in groups, at a round table. The teacher circulates to monitor students' work and to be available to those who need further support.

Though they may begin with concrete objects, the students are expected to represent their work on paper. Sami solves the problem by drawing. She draws five pencils, each separated by a line, on her paper. She then draws six more pencils, recounting the figures several times as she does so, to see if another pencil is necessary. Like many of us, she has some difficulty predicting how much space she will need.

When she finishes her drawing, she brings her paper to her teacher and says, "Here's my answer." Her teacher responds, "Oh, I see you've drawn some pencils. What did you find?" "Oh," Sami replies. "I need to count them." She quickly returns to her desk and counts the pencils, writing the numerals as she does so (see Figure 1–1).

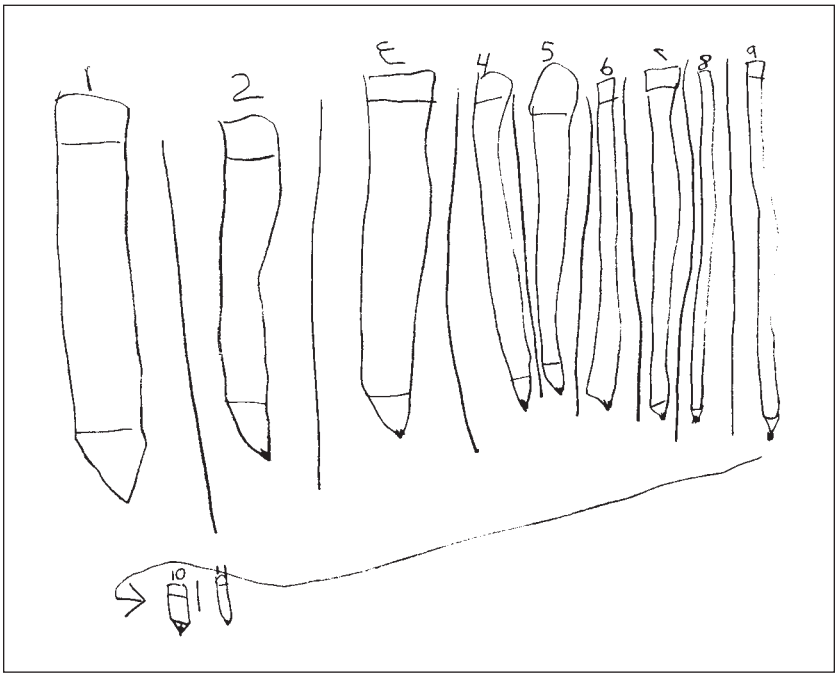


FIGURE 1–1 *Sami's work*

Nick takes his pencil and taps it across the table several times. Then he repeats the tapping, using his fingers to keep track of each tap. He records an 11 on his paper and brings it to his teacher. "It's eleven," he tells her as he shows his paper. When his teacher asks him to show how he got the answer, Nick draws the two groups of pencils and explains that he "just used his pencil" to get the correct sum (see Figure 1–2).

On their representations, Sarah and Zed each show an answer and indicate how they found that answer. Sarah (Figure 1–3) documents that she can use a known fact, 5 + 5, to find the sum of 5 + 6. It is clear from her representation that she used mental arithmetic rather than the manipulation of objects. Curious about the drawing, Sarah's teacher asks her what the dots above the figure's head mean. "Oh, that means I'm thinking it. It's sort of like a word bubble, but different."

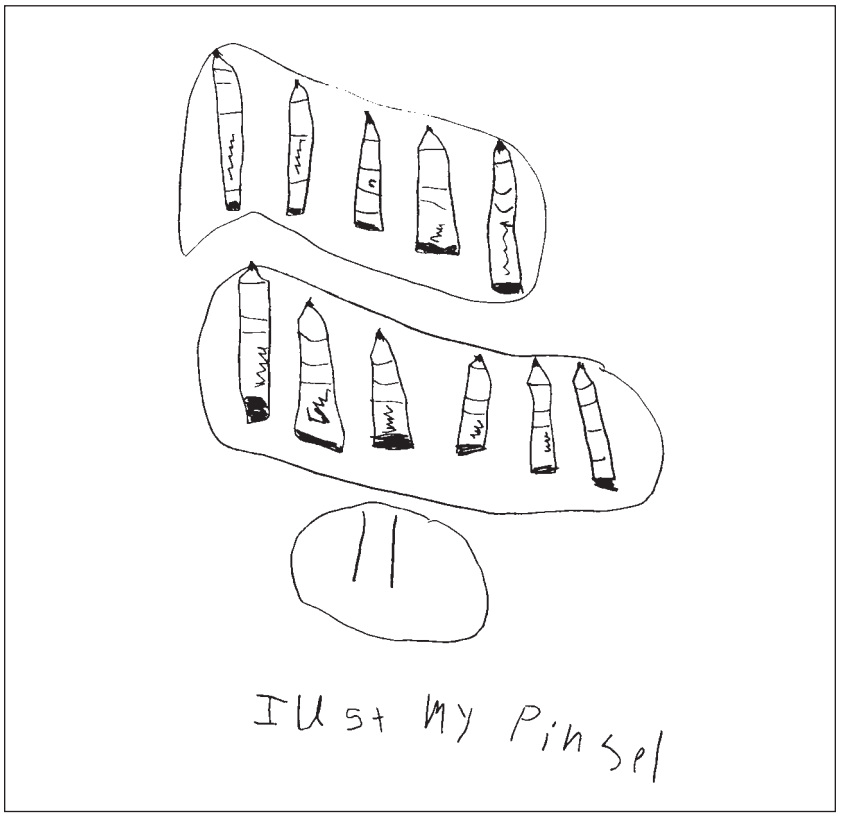


FIGURE 1–2 *Nick's work*

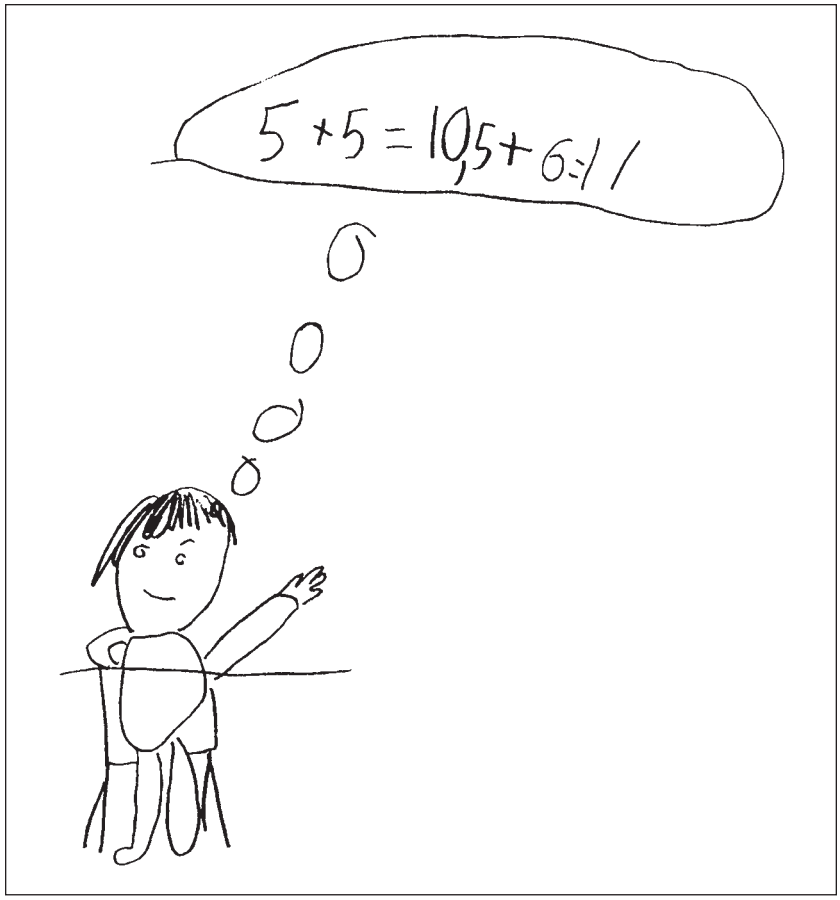


FIGURE 1–3 *Sarah's work*

Zed uses small stones as models for the pencils. He forms a group of five stones, then six stones, and then pushes the two groups together. Next, he counts the stones one by one as he pushes them from one side of his desk to the other. In his representation (Figure 1–4), an arrow joins the two groups together.

While it is just midyear, the children are adept at showing their thinking and their answers. Sometimes the teacher asks a child if there is another way to show his work or record her thinking. Nathan records the equation 5 + 6 = 11. When the teacher asks him if he can show another way, he illustrates counting on fingers (see Figure 1–5).

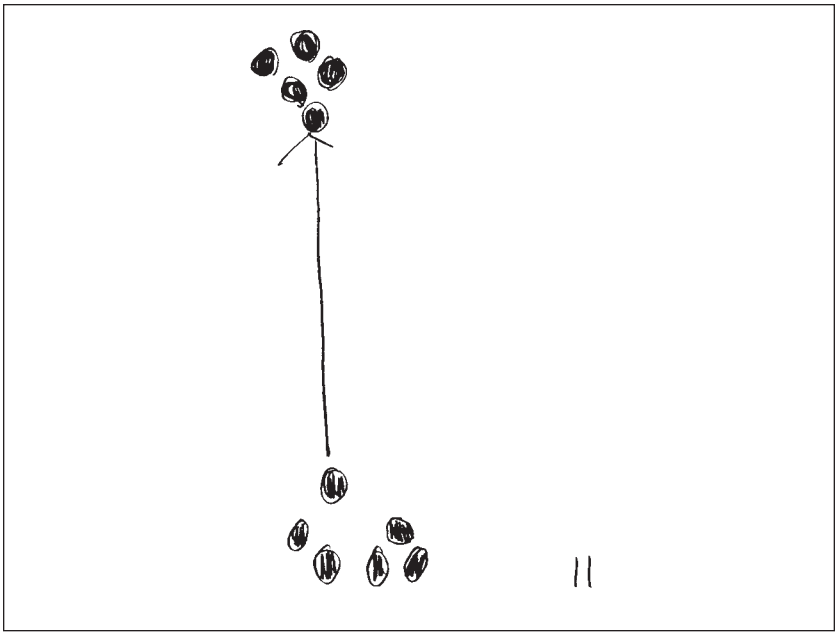


FIGURE 1–4 *Zed's work*

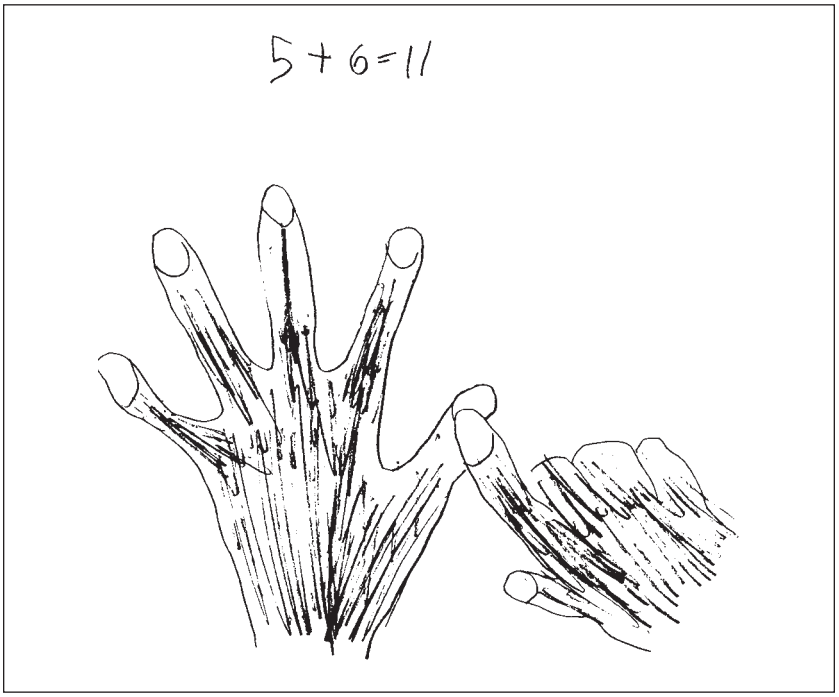


FIGURE 1–5 *Nathan's work*

Lucy's work (Figure 1–6), provides the greatest number of different ideas. She represents the pencils by drawing a single pencil labeled with a numeral that tells how many pencils are in each group. Her codes, "utt" and "btw," indicate which group is under the table and which is by the window. (The words are written out parenthetically after a classmate asks what the letters mean.) She draws hands another way to count the objects, and finally records the appropriate equation. She clearly has several ways to express her understanding of the problem and strategies for solving it.

The variety of these depictions is quite remarkable. These students have not been shown one right way to illustrate their work or answers. They have been allowed and encouraged to develop their own styles of pictorial and symbolic representation. Note that these representations can be thought of as both processes and products. That is, some children find the answer to the problem by making a representation of the given information. Other children may focus on the communication of their answer once they have found it. Some, like Lucy, portray an answer and a variety of ways to find the answer.

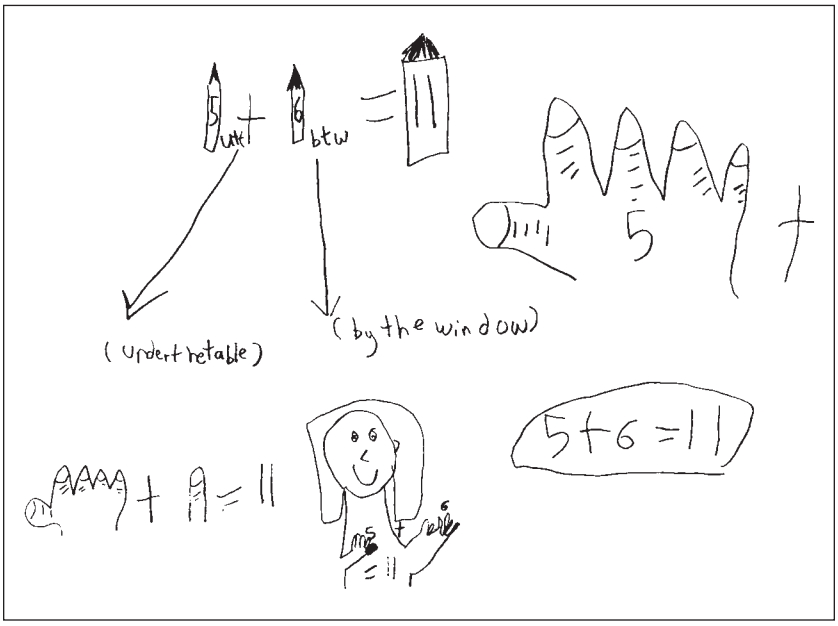


FIGURE 1–6 *Lucy's work*

Once the children have had the opportunity to record their work, they gather again in a circle to discuss their thinking. The teacher is aware that all of the children have now arrived at the correct answer. She confirms this with the group and then quickly steers the conversation toward the variety of ways in which the children solved the problem. Each child holds up his or her paper and talks briefly about what is shown. The following discussion then ensues:

TEACHER: WHAT DID YOU NOTICE ABOUT THE REPRESENTATIONS?
SAMI: There were lots of pictures of pencils.
TSUNG: And hands.
MADDY: I like the way Nathan drew the fingers.
TEACHER: DOES ANYONE ELSE HAVE A COMPLIMENT TO GIVE?
PABLO: I like Sarah's thinking dots.
ANTHONY: Does it always go like that?
TEACHER: WHAT DO YOU MEAN, ANTHONY?
ANTHONY: Well, that "one more" stuff *[referring to adding 1 to an easier equation, such as 5 + 5 = 10, to get 11]*.
TEACHER: THAT SOUNDS LIKE SOMETHING WE SHOULD INVESTIGATE.

Verbalizing their work is an essential part of a show-and-tell approach. It helps children to clarify and solidify their thinking and exposes them to the thinking of others. Such exposure allows for the development of a broader and deeper understanding of topics. Over time, children may adopt one another's approaches for solving problems or representing work. In this class, a few of the students began to use Sarah's "thinking dots" to indicate that they used mental arithmetic.

These conversations, or debriefing sessions, often lead to other investigations. Anthony has raised an important question. Although the "doubles plus one" strategy has been discussed previously, its use is not yet clear to all of the students. It appears as if Anthony is now ready to reconsider the idea.

Throughout this process, show-and-tell serves a variety of purposes. Some initial telling takes place to help children familiarize themselves with the situation. Then the children do some work that involves representing, either mentally or physically, the mathematical situation. The representation brings ideas more

clearly into focus and helps children to develop deeper understanding. It may serve as a way to translate the abstract into the concrete. As they work, children coach each other and share their thinking—"tell"—with others sitting nearby. More "showing" then takes place as they are required to record their answers and represent their thinking.

When they finish their work and gather again as a group, students both show and tell their thinking. Through this sharing, they can begin to link a variety of representations of the same idea. This linkage allows for more robust mathematical thinking. They may also refine their thinking as a result of the debriefing or want to revise their work.

The ways in which communication and representation can permeate children's investigations of a mathematical task are summarized in Figure 1–7 on the following page. Note that as students come to understand and work on a task, communication and representation are *processes* that support their investigations. In the debriefing stage, the focus is on *products*.

## Better Teaching

A show-and-tell approach to teaching helps us be better teachers of mathematics and our students be better learners of mathematics. There are a number of ways that this approach can support these goals. For example, it can provide us with insights into what every one of our students is thinking. Such insights help us to identify students' strengths and weaknesses. They inform our teaching strategies and instructional plans. We can better identify a question to ask or a material to use. Over time, we can better stimulate and support the learning of each child.

A show-and-tell approach holds children accountable. They know they must document their thinking. Through this documentation, they often understand their thinking more clearly. They may develop a deeper understanding of their work and identify new ideas to pursue. They are also expected to listen to others respectfully. Through the exchange of ideas, they make connections among different approaches and representations.

When children are expected to show and tell, it is easier to document their learning. Opportunities to record anecdotal notes about student conversations abound. Artifacts of student

| | Processes | Products |
|---|---|---|
| **Understanding Task** | Reading the problem/ task together | Personal understanding of task statement |
| | Talking about what it means | |
| | Connecting with the language of the task statement | |
| | Brainstorming strategies | |
| **Working on Task** | Dramatizing the implied action | Notes |
| | Building models | Models and drawings |
| | Sharing ideas with a classmate | |
| | Making drawings to show what happens | |
| | Creating mental representations of the situation | |
| | Coaching classmates | |
| | Guessing and checking with models | |
| | Using notation to keep track | |
| | Creating an equation | |
| **Debriefing** | Linking representations | Oral presentation |
| | Reflecting on work | Recorded representation of thinking |
| | | Recorded answer |
| | | Class poster of ideas |

FIGURE 1–7 *Show-and-tell processes and products*

thinking are numerous. By examining these records over time, we can analyze student growth and share this information with parents and school officials.

Today, teachers often feel pulled in several directions. Many early-childhood teachers believe in a constructivist approach to learning and want to ensure that their students have the opportu-

nity to gain meaningful mathematical ideas in a developmentally appropriate manner. This may mean a curriculum and style of teaching that emphasizes building understanding and making connections. At the same time, teachers want to make sure that their students are learning the skills that they need. Further, parental and state influences are placing an increased emphasis on accountability and proof of effectiveness. A show-and-tell approach can help meet the simultaneous challenges for understanding, skill development, and accountability (see Figure 1–8).

### How Can Teachers Support the Show-and-Tell Process?

The role of teacher has changed. No longer is she the one with all the answers, nor is it necessary for her to model each step of a problem in order for her students to parrot their knowledge back in some way. Instead, the teacher needs to share the stage with

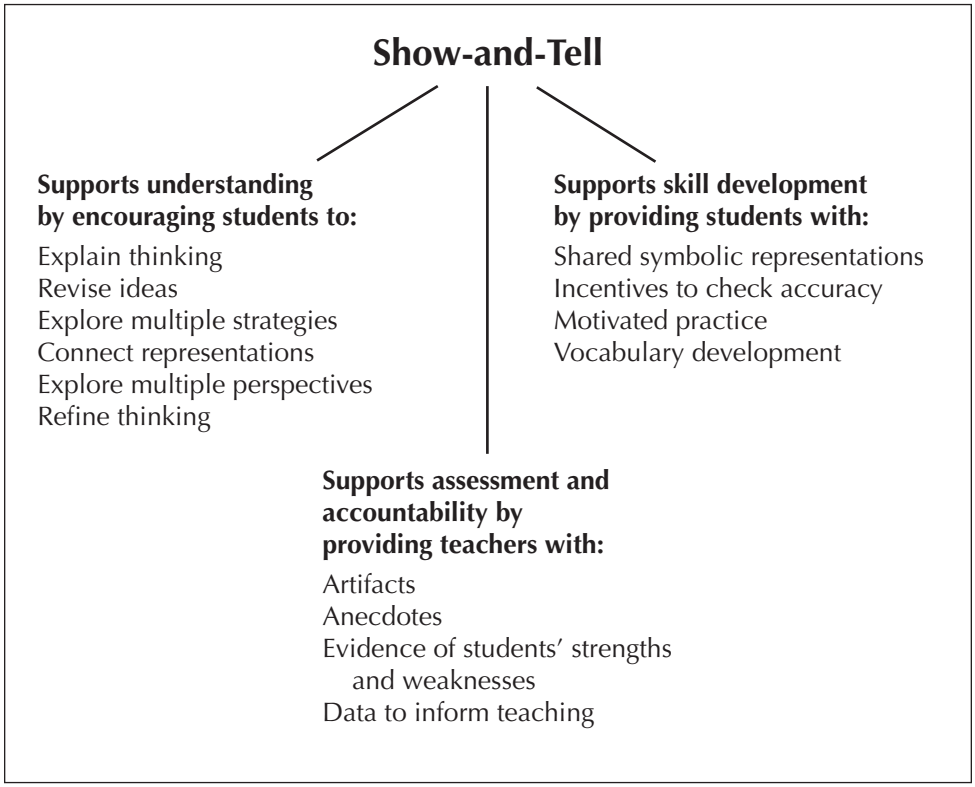


FIGURE 1–8 *Supporting simultaneous challenges*

her students. She needs to set the activity into motion and then step aside to see how her students make sense of each new situation. Her role varies daily, based on the needs of her students. In one situation she may act as a sounding board for a student trying out a hypothesis, in another she may need to ask probing questions to help students refine their ideas.

In the following conversation with a first-grade student, the teacher takes on the role of listener. Rosa has brought the book *The Bus Stop*, by Nancy Hellen, over to show her teacher. This book tells the story of people waiting in line at a bus stop. The characters are introduced sequentially, until seven people are in line. After each new person joins the line, a phrase is repeated—"But can you see the bus yet?" The facing pages at the end of the book show the seven people in line on the left page. The right page is a picture of a landscape. Embedded in the landscape are cutout rectangles. When this page is turned, the cutouts serve as windows on the bus. They are superimposed over the people standing in line, who now appear within the windows. The story has become a favorite in this class since it was read well over two weeks ago.

ROSA: Can I show you the trick in this book?

TEACHER: WHAT TRICK?

ROSA: You can see the bus, you know!

TEACHER: WHAT DO YOU MEAN?

ROSA: I'll show you. *[Rosa turns to the second-to-last page. The text reads, "Seventh is Ms. Pascal going to open her bookstore . . . but can you see the bus yet?"]* I can see the bus, can you?

TEACHER: NO.

ROSA: Look closely.

Though the teacher thinks she knows that Rosa is referring to the cutouts cleverly camouflaged in the illustration, she plays along as though she is not sure.

TEACHER: I DON'T SEE IT.

ROSA: Look, there are seven windows. *[She begins to count by running her finger over each of the cutouts that will become the windows on the bus when the page is turned.]*

ROSA: One, two, three, four, five, six. *[She counts again to make sure that she has counted correctly. It is clear that she is facing a mathematical dilemma.]* Wait a minute. There has to be seven!

TEACHER: WHAT DO YOU MEAN? WHY DOES THERE HAVE TO BE SEVEN?

ROSA: See *[she turns the page, revealing the red bus with the seven characters mentioned in the story seated, ready to drive away]*, there are seven. *[She counts out loud as she touches each person in the illustration.]* There are seven people. *[There is a long pause as Rosa carefully studies the illustration.]*

TEACHER: WHY DO YOU THINK THERE SHOULD BE SEVEN WINDOWS?

ROSA: There are seven people. Each person gets a window. *[Rosa continues to look critically at the picture.]* Oh, I get it! Sean and his mom are in the same window. He must have to sit with his mom because he is a baby.

During this exchange, Rosa stumbles upon a very important mathematical idea. As she begins to check her assumption of one-to-one correspondence, she discovers that there can be a two-to-one relationship as well. When a teacher can sit back and listen, innumerable possibilities may develop. Rosa's teacher has had the pleasure of witnessing this thinking evolve, and Rosa seems satisfied that she has shown her teacher the "trick" in the book. Indeed, Rosa has learned a new trick herself!

**Teacher Reflection**

I was so pleased that I had time to listen to Rosa. It's too often that one of the children comes up to me and I'm in the middle of something, too busy to really focus on what she is trying to tell me. The child knows I'm rushing, and therefore doesn't really take the time to fully communicate her ideas.

In order to support students as they engage in mathematical thinking, we need to see the value of giving them time to formulate their ideas. Time is needed as students tackle new concepts and develop representations that depict their thinking. Writing down a simple calculation takes considerably less time than

showing how one arrived at a solution. Time must be provided so that students can continually build on their understandings and exchange their ideas.

In order for students to invest their time in this activity, they need to see the value of showing and telling their ideas. When we demonstrate a sincere interest in their thinking, students respond in kind. In effectively implementing the show-and-tell approach in our classrooms, many questions come to mind, including:

- Is there a best time or way for mathematical discussions to take place?
- What kind of representations can young children make? How do they change over the grade levels?
- How can we help young children stay engaged in this type of work?
- Can young children sustain a meaningful debriefing session?
- How can we use mathematical showings and tellings to inform our teaching and to assess learning?

This book focuses on the show-and-tell approach to teaching mathematics in kindergarten, first-grade, and second-grade classrooms. In order to help illustrate these techniques across the curriculum, chapters are organized around particular content strands. Throughout the chapters, classroom examples and teacher reflections shed light on the questions raised above.