

## CHAPTER 2

# OPEN STRATEGY SHARING

Chances are if you've asked children to share their thinking about a math problem, you've led an *Open Strategy Sharing* discussion. *Open Strategy Sharing* is typically the first way to get mathematical discussions going in classrooms. It's like having a good, basic recipe for a soup from which you can make all kinds of variations. *Open Strategy Sharing* allows you to nurture the norms needed for a productive math-talk community. And you can use

this discussion structure to model how students should talk and listen with one another.

Too often we associate being good at mathematics with being fast and correct the first time through. We love how Sarah Michaels, Mary Catherine O'Connor, and Megan Williams Hall (2010) describe intelligence:

*Intelligence is much more than an innate ability to think quickly and stockpile bits of information. Intelligence is a set of problem-solving and reasoning capabilities along with the habits of mind that lead one to use those capabilities regularly. It is also a set of beliefs about one's right and obligation to understand and make sense of the world and one's capacity to figure things out over time. Intelligent habits of mind are learned through daily expectations placed on the learner. By calling on students to use the skills of intelligent thinking—and by holding them responsible for doing so—educators can teach intelligence. (2)*

Over time, as students experience themselves and their classmates as people with good mathematical ideas, you will see a big difference in how much they're willing to persevere and take risks in front of one another.

## What Is Open Strategy Sharing?

Many mathematics problems lend themselves to multiple solutions. In *Open Strategy Sharing*, students listen for and contribute different ways to solve the same problem. The teacher often asks *how* questions, such as “How did you think about the problem?” and sometimes *why* questions, like “Why did you start with the seven?” Most importantly, the teacher invites children to share by asking, “Who thought about this a different way?” Students are supported to listen to each other, and often invited to repeat their classmates' strategies to make sure they are hearing and understanding the ideas being shared. The goal of *Open Strategy Sharing* is to bring out a range of possible ways to solve the same problem and build students' repertoire of strategies.

## How Do You Get Started?

Before you begin *Open Strategy Sharing*, you'll need to decide on a set of norms for doing mathematics in your classroom and you'll need to think about the “talk and listening moves” you want to use to get discussions underway.



### ***Norms for Doing Mathematics***

Teachers introduce and cultivate norms in the classrooms in many different ways. Whatever your method, we think it's important to pay explicit attention to the norms you want to foster. We offer the following list of norms as a way of bringing to life the principles we introduced in Chapter 1. This particular list was inspired by the Standards for Mathematical Practices in the Common Core State Standards (2012), norms suggested by one of our favorite books, *Classroom Discussions* (Chapin, O'Connor, and Anderson 2009), and norms we've seen at play in many classrooms with productive and nurturing learning environments.

In this class, we will do the following:

- Make sense of mathematics  
*We think all children should see mathematics as a subject that needs to make sense to them. We don't want children to follow procedures just because their teachers, parents, or peers tell them to.*
- Keep trying even when problems are challenging  
*Mathematics often has been seen as a school subject that students excel in because they are fast. Not all mathematics problems can be solved in a split second. Problem solving takes planning, strategizing, and persistence.*
- Remember it's okay to make mistakes and revise our thinking  
*Children must feel comfortable to take risks, to put out partial ideas or ideas that are still in development, and to stumble when they are learning something new. Being able to revise one's thinking gives students the message that rough draft thinking (Jansen 2020) is welcome in mathematics as much as it is valued in writing instruction.*
- Share our mathematical ideas with our classmates (whether we are using words, numbers, pictures, gestures, or tools)  
*Words are not the only way to display mathematical ideas. And sometimes informal language, gestures, and diagrams can convey ideas that we cannot yet fully articulate in words. Multilingual students, students new to an idea, students with disabilities, and students who tend to be quiet and participate through active listening can be supported to participate productively by knowing that verbal participation is not the only way to show understanding.*
- Listen to understand someone else's idea; give each other time to think  
*Listening is as important to learning as is talking and sharing your ideas in other ways. Teaching children what to listen for and how to listen to*

*themselves and each other is an essential part of creating a community of learners that understand and move one another's ideas forward.*

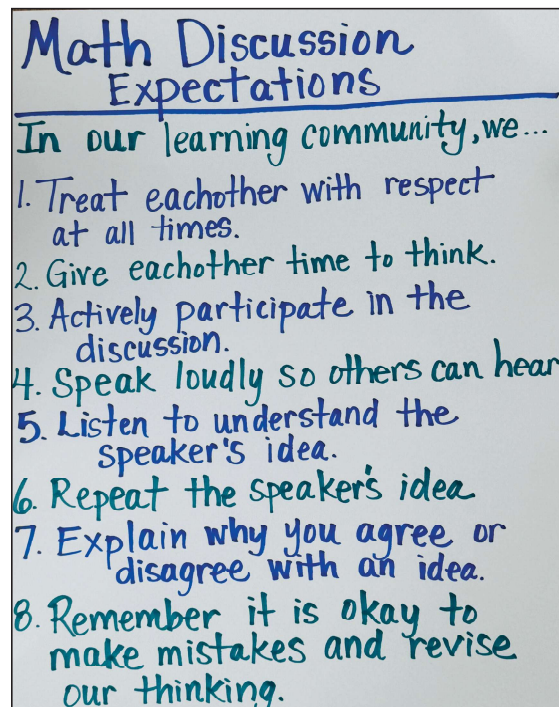
- Ask questions that help us better understand the mathematics  
*You'll notice that we care a lot about the messages students receive regarding what it means to be "smart" or capable. Asking questions of one another is a way to show that we are listening and trying to understand the ideas being discussed. Asking questions also shows that we are curious about mathematics and that we care that children are making sense of the ideas. We want to frame questions as an important part of the learning process and help students to understand that asking a question doesn't mean they are wrong or that we are revealing something that they should have known.*
- Agree and disagree with mathematical ideas, not with each other  
*Being able to agree and disagree with the mathematics being discussed is an important part of examining or questioning mathematical ideas. But disagreeing with an idea can be socially uncomfortable. Knowing that it is the mathematical idea, not the person, you are disagreeing with can make disagreeing feel safer and productive.*
- Remember that everyone has good mathematical ideas  
*In a classroom community, all members bring important thinking and ideas to the discussion. Helping students recognize their own and their classmates' thinking and remembering that there is logic within each person's idea is important for a thriving mathematical community. It's important for students to have experiences where they are able to solve problems by putting their minds together to verify ideas. The teacher is not the sole authority of knowledge.*

There are many different ways to set up norms in our classrooms, and this list is by no means the only or the best one. But we hope it will inspire you to collaboratively generate norms with students that will support your classroom community. Figure 2.1 shows a similar list developed by a school we have worked closely with. It is used across all kindergarten through fifth-grade classrooms. It may be powerful for you to work with your colleagues to nurture a set of expectations that students experience consistently across classrooms in your school or grade level.

### ***Talk and Listening Moves***

We find the talk moves described by Suzanne Chapin, Catherine O'Connor, and Nancy Anderson (2009) in *Classroom Discussions* enormously useful in helping us think about getting discussions off the ground. The beauty of the authors'

Figure 2.1 Discussion expectations



five talk moves is that they can guide both teacher talk and student talk. In the first edition of *Intentional Talk*, we added two additional talk moves, “turn and talk” and “revise your thinking”, to help round out the list.

In this second edition, we have further revised the talk moves to include listening moves. By paying close attention to how to listen in discussions, we hope to make the underworld of talk—listening—more visible. In order for talk moves to be effective, we believe that paying close attention to the listening that is entailed in talk is an important next step in deepening our classroom discussions. Specifically, the Talk and Listening Moves (see the table on pages 28 and 29) integrate a focus on what teachers and students might say and how teachers and students might listen for each move. For example, when a teacher uses the talk move of “repeating”,

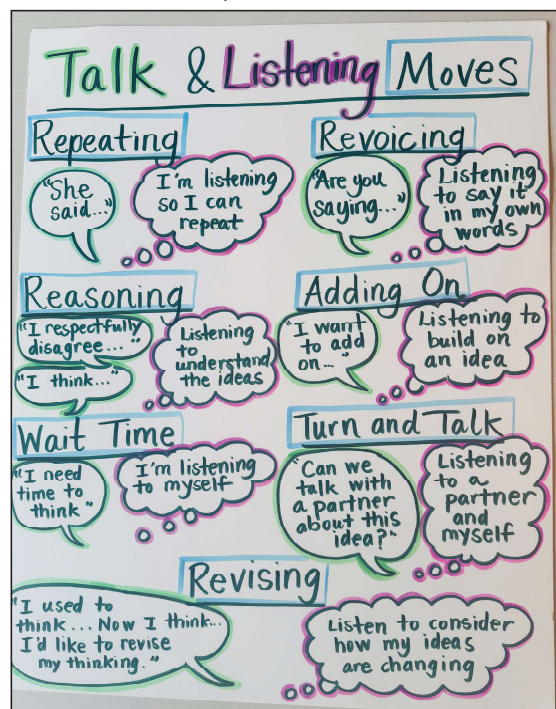
they may be using this move to repeat an important idea and slow down the conversation to consider the idea being discussed. That may sound like “Can you repeat what she said (about \_\_) so we can hear it again?” Leading up to this move, the teacher was listening to consider when it might be useful to slow down and hear the same idea multiple times. While the idea is being shared, students are listening closely to hear, understand, and be able to repeat all (or part of) another person’s ideas. This sophisticated work requires students to listen, make sense of, and generate questions they may have, and keep track of their own ideas and how they may be similar to or different from the idea being repeated. By paying attention to how teachers and students may listen, we can better understand and explicitly support the demands listening poses for teachers and students in discussion. In Figure 2.2 you will find a classroom poster that can help students consider what it might sound like when they use talk moves and what they may be thinking about when they are listening within each move. We hope this poster may inspire your classroom community to develop their own poster to support students’ use of talk and listening moves. We will hear the talk and listening moves in action throughout vignettes across the book. If you’re interested in delving deeper into classroom listening for teachers and students, see Appendix H for resources about listening in classroom discussions.



<b>Talk and Listening Moves to Support Classroom Discussions</b> Adapted from Chapin, O'Connor, and Anderson (2009)			
Move	Purpose	What teachers and students might say	How teachers and students might listen
<b>Repeating</b> Asking someone to repeat what another person said	Repeating important parts of an idea in order to slow the conversations down and consider the idea(s) being discussed	<b>Teacher:</b> <i>Can you repeat what she said so we can hear it again?</i> <b>Student:</b> <i>She said ...</i>	Teacher listens to consider when it might be useful to slow down and hear the same idea multiple times.  Students listen closely to hear and repeat another person's ideas. Student will need to keep track of their own ideas and someone else's ideas.
<b>Revoicing</b> Restating in their own words some or all of what another person said	Revoicing can be used to clarify, amplify, or highlight an idea for further consideration	<b>Teacher:</b> <i>Do we hear you saying ...?</i> <b>Student:</b> <i>So are you saying ...</i>	Teacher listens to track how ideas are being expressed and when it might be useful for the group to hear more clarification and/or zoom in on an idea in the discussion.  Students listen in order to rephrase what they heard.
<b>Reasoning</b> Thinking aloud about the idea(s) being discussed	Reasoning—individually and collectively—to understand and consider the ideas being discussed and how they are related	<b>Teacher:</b> <i>Do you agree or disagree with that idea; why?</i> <i>Can you connect those two ideas?</i> <b>Student:</b> <i>I respectfully disagree with that idea because ...</i> <i>I was thinking about that idea in a different way ...</i> <i>This idea makes sense to me because ...</i>	Teacher listens for important and emerging ideas to invite deeper reasoning, to compare and connect ideas.  Students listen to the ideas being discussed in order to understand another's reasoning and consider their own and the collective sense making.

<b>Adding on</b> Inviting someone to build on what is being said	Adding on allows students to build on others' and their own ideas	<b>Teacher:</b> <i>Would someone like to add on to what we're hearing?</i> <b>Student:</b> <i>I want to add on to what is being said, I also think that ...</i>	Teacher listens for opportunities for expanding on and building out an important idea in the discussion.  Students listen to another's thinking in order to build on their idea.
<b>Wait time</b> Pausing to allow time for thinking	Wait time allows students a pause in the discussion to think, gather their thoughts, and reason	<b>Teacher:</b> <i>Take your time.</i> <i>Let's give everyone a minute to think to yourself.</i> <b>Student:</b> <i>I need more think time.</i>	Teacher listens for where think time would help with sense making.  Students listen to their own thinking as they make sense of their, and the group's, evolving understandings.
<b>Turn and talk</b> Turning and talking in small groups or pairs	Turning and talking in small groups or pairs allows students to consider, clarify, and engage with emerging ideas. It helps students rehearse and try out their own response and listen closely to one peer's ideas. It is an important time for more student voices to emerge than possible in whole-group discussions	<b>Teacher:</b> <i>Turn and talk to your neighbor about ...</i> <b>Student:</b> <i>Can we talk with a partner about this idea?</i>	Teacher listens for when smaller discussions would benefit the whole-group discussion. Teacher listens in while students discuss with peers or in small groups to hear what students understand and are coming to understand in order to make decisions about the current or future discussions.  Students listen to their peers' ideas, their own thinking, and engage in sense making.
<b>Revising</b>	Revising supports students in understanding that changing your thinking and reconsidering your ideas are important parts of discussion and sense making	<b>Teacher:</b> <i>It sounds like you are starting to wonder ... Do you want to revise your thinking?</i> <b>Student:</b> <i>I thought ... But now I think ... I'd like to revise my thinking.</i>	Teacher listens for shifts in understanding to create space for sense making.  Students listen to their own and each other's ideas to consider where their thinking is shifting and changing.

Figure 2.2 Classroom poster of talk and listening moves



## Planning for Open Strategy Sharing in Your Classroom

Getting started planning an *Open Strategy Sharing* discussion is rather straightforward. You begin by selecting a problem or task that has multiple viable solution paths. Listing possible strategies for your own reference can help you anticipate what you might hear from students. You could choose to give students time to solve the problem and share ideas on paper or with a partner to allow you to listen in or observe, giving you advanced notice of your students' strategies. Or you could call on students and learn about their strategies for the first time along with your students.

Here's a protocol to help you plan and facilitate the discussion (see also the planning template in Figure 2.3 and Appendix A):

- Select or design a problem or task that can be solved in more than one way. Anticipate how children may approach and solve the problem.
- Decide whether you want children to work on their own, in partners, or in groups to solve the problem.
- Pose the problem, making sure students understand the problem and have a way to get started. Take anecdotal records while they work individually, in pairs, or in small groups as you circulate to listen in or observe their thinking.
- Have students share two to four different ways to solve the problem. Use talk and listening moves and clear representations to help students understand what they hear.
- Close by highlighting the different ways students thought about the problem.

It's important to note that you do not begin an *Open Strategy Sharing* discussion by modeling a particular way to solve the problem. Instead, your job is to select a problem, or a problem context, that students will be able to solve in a number of different ways. Choosing such a task honors the principle that children are sense makers.



Figure 2.3  
Open Strategy  
Sharing  
planning  
template

Planning Template for Open Strategy Sharing

Open Strategy Sharing			
Problem to pose			
Why I chose this problem	Math Goal	Social or Community Goal	
Opening the lesson			
How might my students solve this problem?	Who I saw solve it this way?	Share today?	
Notes to myself about what I'm trying to notice and listen for			
Other strategies that emerged during the lesson			
Closing the lesson			

*Open Strategy Sharing* provides a good opportunity to set up norms and practice talk and listening moves. Students learn how to talk about their ideas and how to hear and engage with others' ideas. Students can be supported to learn how to share and listen by what the teacher says or what the teacher attends to. For example, a teacher might say, "Did you all just hear what Elijah said? He said he wanted to 'revise his thinking.' That's one thing we can say in our classroom when we want to change our idea." By saying this, the teacher is supporting students in knowing that revising ideas is something mathematicians do in this classroom and that it's easy to signal a change by saying, "I'd like to revise my thinking." You can also give support by posting sentence stems that help students know how to share mathematical ideas in a discussion (see the word bubbles in Figure 2.2).

## Open Strategy Sharing In Action

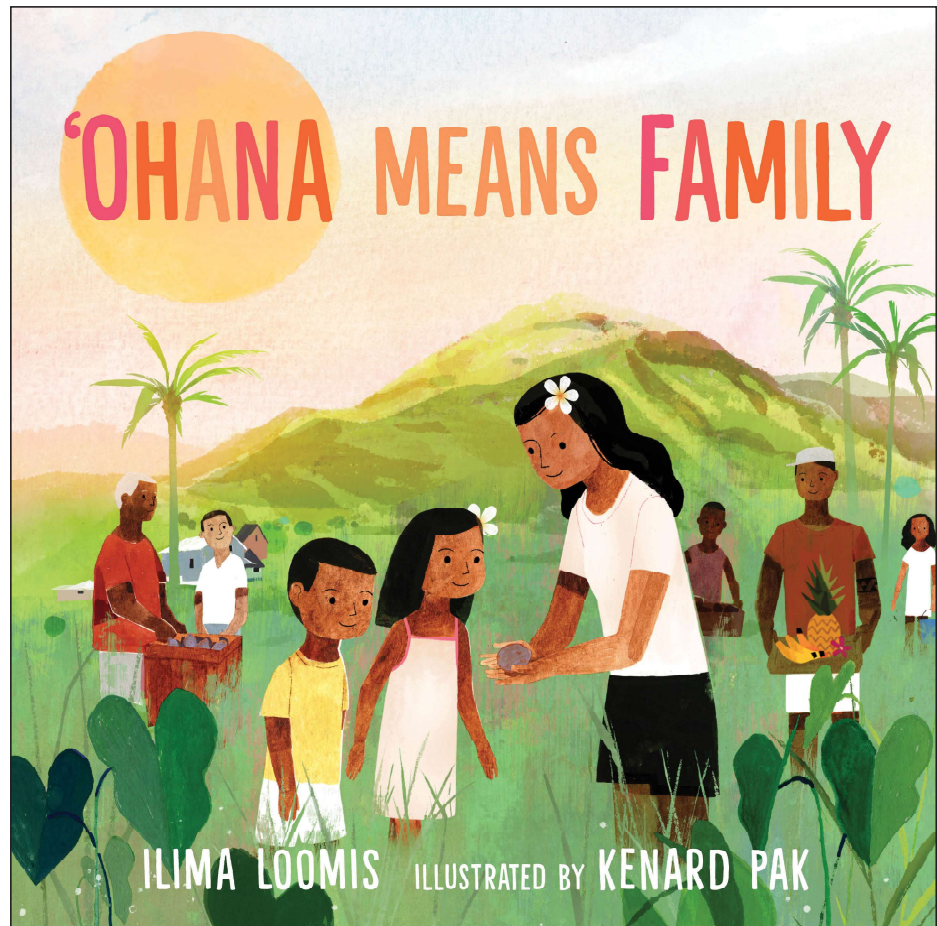
Kamali'i Elementary School, located on the island of Maui in Hawai'i, is home to a diverse population of students and families who identify as Native Hawaiian, Filipino, Hispanic, white, Tongan, Micronesian, and as being from various Pacific Island nations. In this school community, where children, families, and teachers hold deep cultural connections to the land, lessons are driven by students' questions and often provide openings for children to bring forward, and learn more about, their families' cultural and linguistic funds of knowledge (González, Moll, and Amanti 2005).

As we join the Kamali'i community through two vignettes in this section, students and teachers have recently engaged in a school-wide reading of the children's book, *'Ohana Means Family*, written by Ilima Loomis and illustrated by Kenard Pak (2020; see Figure 2.4). This story, a celebration of Hawaiian land and culture, follows a family, or 'Ohana, as they harvest taro. Taro, a root vegetable, is a culturally significant plant, essential to Native Hawaiians not only as a food source but also for its role in traditional stories and spiritual ceremonies. Teachers selected this story because many of their students have knowledge about harvesting taro and discussing this story will deepen their understanding of life in their local community.

Reading the same story school-wide is a common practice at Kamali'i. Together, as a school community, children and adults select a story to read in every classroom on the same day to build a school-wide culture of belonging and connection across the school. Reading the same story allows for children and adults in the community to have a common experience. It's typical to hear stories, such as *'Ohana Means Family*, referenced throughout the school's breezeways, playground, and even car and bus rides among siblings, cousins, classmates, teachers, and families. At this school, read-alouds are used as a tool to support both literacy and math learning for children.

Let's join two classrooms at Kamali'i as they engage in an *Open Strategy Sharing* discussion the day after reading *'Ohana Means Family*. Both classes, one intermediate and one primary, are discussing what students noticed and

Figure 2.4  
'Ohana Means  
Family book  
cover



wondered while reading the story the previous day. The first classroom we will visit is a fourth-grade class where the teacher and the school math coach are collaboratively teaching. They are working to broaden participation among students and supporting students to engage in deep listening to each other and themselves. The second classroom is a first-grade classroom where the teacher is supporting young mathematicians to learn how to share their thinking and listen to others' thinking in math discussions.

### *Open Strategy Sharing Through Children's Literature in a Fourth-Grade Classroom*

After reading *'Ohana Means Family* the previous day with the prompts of "What do you notice?" and "What do you wonder?" and charting students' ideas, Mrs. Carrasquilla (the school math coach) and Mr. Lee (a fourth-grade teacher) study



Figure 2.5  
Two-page  
spread in  
'Ohana Means  
Family



students' ideas to collaboratively plan an *Open Strategy Sharing* discussion. They notice students wondering within the kalo field context about questions such as “Does kalo always grow in bunches?”, “Does kalo grow in combinations of five or three stalks and leaves like in the illustration?”, and “How many kalo plants are in a row and in the patch?”

Mrs. Carrasquilla and Mr. Lee reflect on students' active noticing and wondering on a particular illustration (see Figure 2.5). Thinking about mathematical goals of supporting students' repertoire of counting strategies and sense making

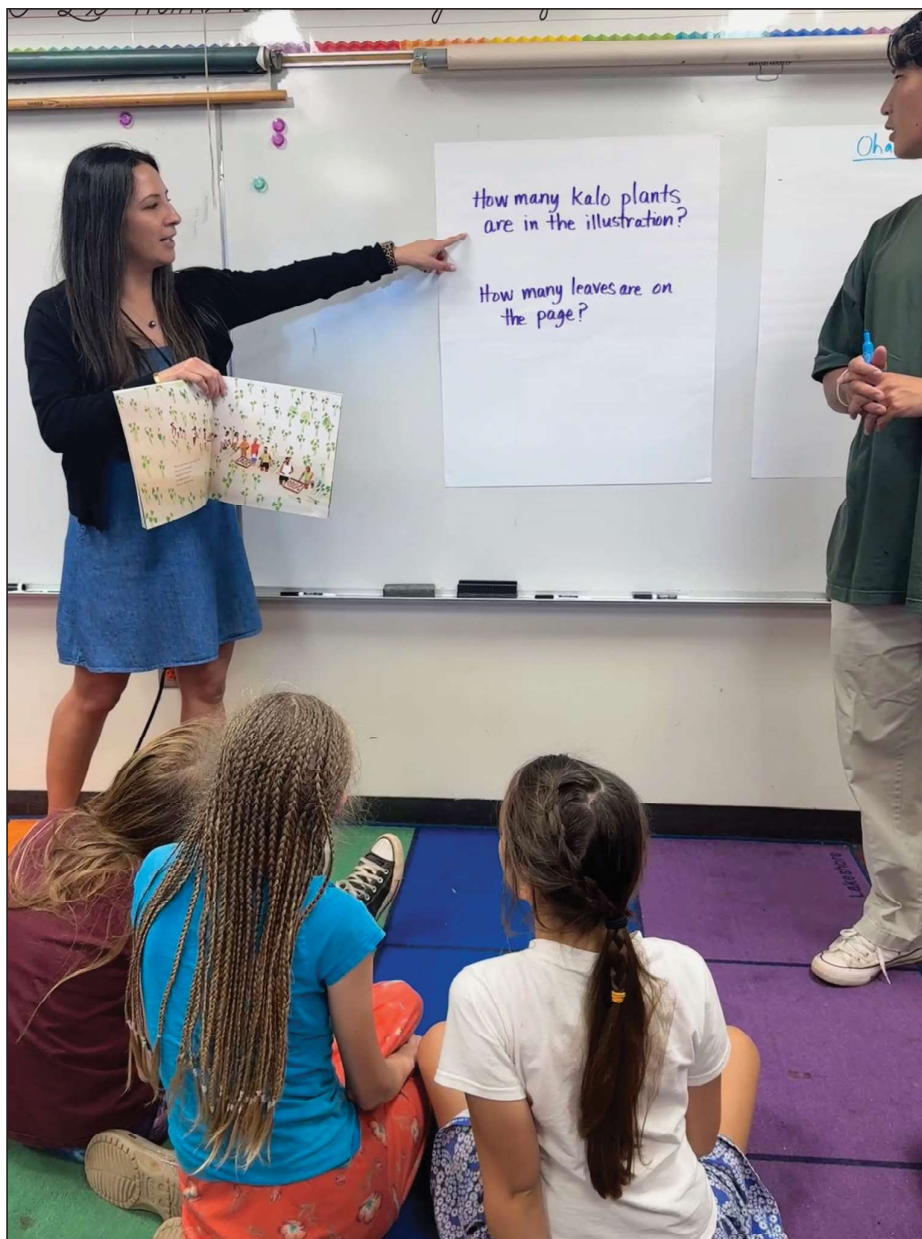
Figure 2.6  
Mrs.  
Carrasquilla  
and Mr. Lee's  
planning  
template  
for an *Open  
Strategy  
Sharing*  
discussion

Mrs. Carrasquilla and Mr. Lee's Planning Template for <i>Open Strategy Sharing</i> Discussion		
Open Strategy Sharing		
<b>Problem to pose</b> <i>How are you counting plants, leaves, and stems in the kalo field illustration?</i>		
<b>Why I chose this problem</b>	<b>Math Goal</b> <i>Support sense making about mathematical modeling and the relationship between addition and multiplication</i>	<b>Social or Community Goal</b> <i>Ground sense making in family and community contexts</i> <i>Broaden participation and support students in deep listening to one another and themselves</i>

Figure 2.6  
(continued)

Opening the lesson	<p>"Yesterday we heard you noticing and wondering about this illustration as we were reading, we noticed these themes in the questions you're curious about -- 'How many kalo plants are in the illustration?' and 'How many leaves are on the page?'"</p> <ul style="list-style-type: none"><li>• Invite students to gather in small groups who had same wonder/question.</li><li>• Hand out copies of the book.</li><li>• Make counting tools available.</li><li>• Kneel beside students as they discuss counting strategies to listen and observe.</li></ul>		
<p>Notes to myself about what I'm trying to notice and listen for</p> <ul style="list-style-type: none"><li>• Listen in while students discuss their questions and strategies.</li><li>• Notice and listen for the range of ways students are counting, and their addition and multiplication strategies.</li><li>• Jot notes of students (with names and examples for closing) as they engage in sharing and listening with each other</li></ul>			
How might my students solve this problem?	Who I saw solve it this way?	Share today?	
Counting all by ones	Malia, Mya, and Aukai		
Counting on by ones or skip counting in groups			
Multiplication and addition	Kai, Aiden, and Nalani Lailani, Kainoa, and Sebastian		
Other strategies that emerged during the lesson			
Closing the lesson	<ul style="list-style-type: none"><li>• Thank students for sharing their questions, range of counting strategies, and reasoning about addition multiplication.</li><li>• Name students for their good work in student-to-student talk and listening with a few examples.</li><li>• Let students know we will continue this thinking tomorrow.</li></ul>		

Figure 2.7  
Mrs.  
Carrasquilla  
and Mr. Lee  
co-facilitate  
an Open  
Strategy  
Sharing  
discussion



about mathematical modeling and the relationship between addition and multiplication, they decide to return to this illustration the next day with students. They focus on two themes of questions students are curious about: “How many kalo plants are in the illustration?” and “How many leaves are on the page?” They hope the context of the kalo plant, which has cultural meaning to these

children, and the illustration help ground complex ideas about addition and multiplication in sense making for students.

They use the planning template to jot notes for how they will open the discussion, what they will listen for, ways their students may solve, and how they anticipate closing the discussion. They decide Mrs. Carrasquilla (the math coach) will open the discussion so Mr. Lee (the classroom teacher) can listen to his students. They plan for Mr. Lee to then take the lead within the discussion (see Figure 2.6). With a sketched-out plan, they call students to a whole-group discussion. Within the following vignette, italicized narration provides insight into the teachers' thinking about the decisions they make while facilitating discussion. Their considerations span social and mathematical dimensions of classroom discussions.

Mrs. Carrasquilla holds up a two-page illustration that shows people farming taro, also referred to as kalo (see Figure 2.5). She begins by recapping the students' noticings and wonders from this page and narrows upon the two questions students are curious about (see Figure 2.7). They invite students to gather in small groups with people who had similar wonders and further discuss and investigate their questions. As students spread out around the room, Mr. Lee hands out copies of the book (open to the illustration of the kalo patch) and makes counting tools (such as centimeter cubes, markers, and white boards) available.

While students discuss their questions and strategies, both teachers kneel to listen to students' thinking. As Mrs. Carrasquilla and Mr. Lee listen to students' small group discussions, they jot notes about students' strategies. They confer, using their notes to discuss the strategies they hear students using. They plan to invite sharing today and do not decide ahead of time which strategies will be shared in which order. They do plan to elicit three different strategies because that is how much time they believe they have today.

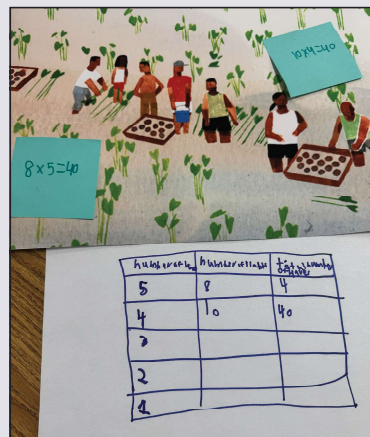
**Mr. Lee:** Class! You are having fascinating conversations about the kalo illustration. You are counting plants, leaves, and stems using a range of counting, addition, and multiplication strategies. Let's come back together as a whole group to have an *Open Strategy Sharing* so we all can hear and understand the different counting questions you are investigating and the ways people are counting in our classroom. Please turn your bodies to face and listen to the students who are sharing. Your job is to listen to other people's ideas so that you can understand their thinking and see what questions you may have to make sense of their reasoning. It is ok if you counted something



different than the group who is sharing. Maybe you counted kalo but the group sharing counted leaves. Or, maybe you counted leaves but the group sharing counted kalo. What is important is that we are sharing counting strategies, whether kalo or leaves, and we are helping each other know how to count. Kai, Aiden, and Nalani, can you get us started by sharing what you are counting and how you are counting? (See Figure 2.8.)

**Kai:** We are counting how many leaves are on the kalo plants. Nalani noticed that some kalo plants in the picture have five or four or three stems. We decided to count how many plants had 5 leaves first and then we saw 8 plants. So we did multiplication to know that 8 plants with 5 leaves was 40 leaves all together. And then we counted how many kalo plants had 4 leaves and so on. We added up how many plants have the same number of leaves and then we have to multiply them, so if 10 plants have 4 leaves that's 40 leaves. First we do multiplication, then we do addition to combine all the leaves. We're not done yet. There are a lot of leaves!

Figure 2.8 Kai, Nalani, and Aiden counting kalo leaves (left) and their sticky notes and table (right)



**Nalani:** I agree with Kai and we also are using sticky notes to keep track of how many plants have the same number of leaves and our multiplication totals so we can add up all the leaves at the end.

**Mrs. Carrasquilla:** Thank you Kai and Nalani for sharing your group's counting strategy. I really like the way you jumped in when Kai was done sharing to add on to his thinking, Nalani! Aiden, what would you add on about your group's counting strategy?

*Mrs. Carrasquilla and Mr. Lee are working on broadening participation and creating student-to-student discourse, specifically encouraging students to add on to and engage with each other's thinking without the conversation going through the teacher with each exchange. Mrs. Carrasquilla is deepening attention to this norm by naming it as something Nalani did and also inviting Aiden into the discussion.*

**Aiden:** We see that some plants go off the page. We have been in a kalo field and we know that the rows go on for a really long time and there are also kalo that are under the mud and water. We are counting the leaves we can see but there are probably more we can't see and for some plants we can only see part of the plant. It is getting tricky because we have to add on leaves like there's one leaf here (*pointing to the illustration*) and two leaves here. Those are not in groups of 3 or 4 or 5, they are ones and twos.

**Kai:** We will add those ones and twos on to our total at the end.

**Mrs. Carrasquilla:** (*Turning to the whole class to repeat the group's strategy.*) Aiden, Kai, and Nalani are counting the leaves. They are paying attention to how many plants have the same amount of leaves and then they are multiplying how many plants by how many leaves. Then they will add up their total of all leaves at the end. They know there may be kalo they cannot see but they want to count all the kalo they can see. (*Turning back to the small group who is sharing.*) Did I repeat your idea correctly? Did I understand what you are telling us?

*Mrs. Carrasquilla pauses to ask if she is repeating the students' ideas correctly. She wants to use talk moves herself, such as repeating, to continue to seed the move in discussions. Specifically here, she wants to reinforce the norm of checking in to make sure that students' ideas are heard and understood accurately when repeating. She is also slowing down the conversation a bit to make sure everyone has a second chance to hear this strategy. She makes eye contact with Mr. Lee to see if he is agreeing with her moves and if he wants to ask or add anything. He nods to continue and students jump in.*

**Aiden, Nalani, and Kai:** (*Nodding yes and all talking at once.*) Yeah that's it. Yes. Yep!

**Mrs. Carrasquilla:** Ok. Can you tell us a bit more about why you are using a combination of multiplication and addition to answer your question?

**Nalani:** We started counting all the leaves by ones and then we thought it was going to take a really long time so Aiden had the idea to just count how many plants have the same number of leaves and then multiply the number of plants by the number of leaves. And add on the ones and twos of leaves at the end. We are making a table to show how many of each plant has the same number of leaves and then we are going to add them all together.

**Aiden:** (*Pointing to the table they are making.*) In this column, we say how many leaves, and in this column how many plants that have that number of leaves, and in this column the total number of leaves for all the plants that have that number of leaves on them.

**Mrs. Carrasquilla:** We hear you saying that multiplication can be a way of counting a lot of items more efficiently because you grouped the leaves into equal sized groups—you have plants with five leaves, four leaves, three leaves. Nalani, in addition to your math thinking, we also hear you spotlighting something Aiden noticed. You said he had the idea to add on the leaves of ones and twos at the end. What I appreciate about what you did was honoring another classmate, Aiden, for their thinking. Everyone brings important ideas to our discussions and you highlighting a classmate for their ideas is something we do for each other in our discussions. (*Turning to the class.*) Can I invite someone to ask the question, “How does your table help you?”

*Mrs. Carrasquilla makes many important decisions here to deepen and seed classroom discussion norms. She chose to repeat Nalai’s mathematical thinking and also to highlight the way Nalani honored Aiden’s thinking. She is working on reinforcing the norm that everyone has good math ideas and that all members bring important thinking to discussions. By calling out the way Nalani honored Aiden, she is naming that attributing another’s thinking is a valued practice in their classroom. Lastly, she invites someone to ask a question and provides the question to ask. She wants to create openings for students to ask each other questions and to know what questions might sound like. She is working on the norm that students listen actively to understand each other and they are active in asking questions during discussions.*

**Mrs. Carrasquilla:** (*Noticing Jane’s hand up.*) Jane, do you want to ask the question?

**Jane:** Yes. How does your table help you?

**Aiden:** (*Chiming in and continuing his earlier explanation of the table.*) It gives us columns to record how many leaves, how many plants have that many leaves, and the total number of leaves for that row in the table. It is kind of a way to organize how we are counting leaves and plants and keeping track of totals.

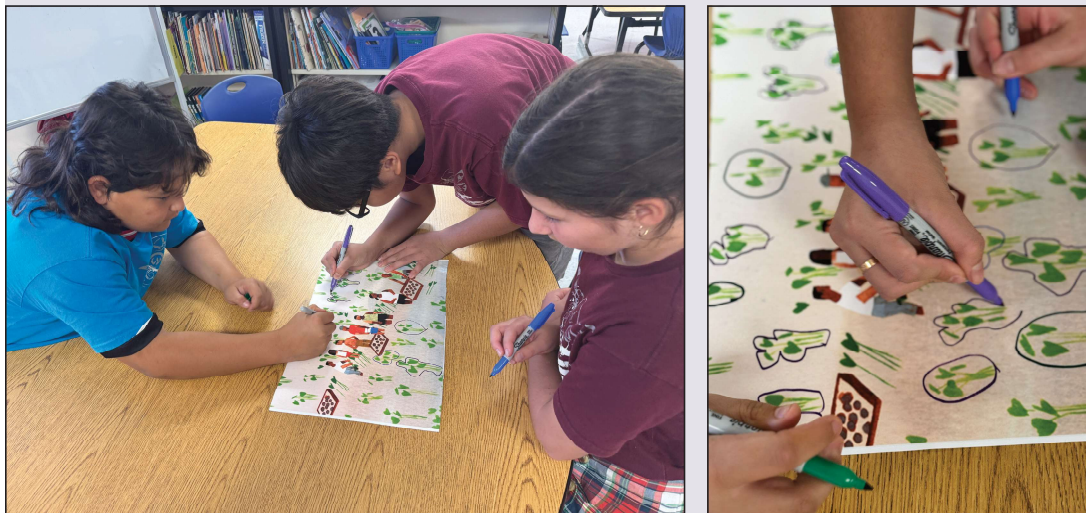
**Mrs. Carrasquilla:** (*Turning to Aiden.*) Thank you for this additional detail, Aiden. (*Turning to Jane.*) Jane, thank you for asking a question. As you listen to each other, you will have questions. Please know you can ask each other questions! (*Continuing with the strategy share.*) Did anyone think about counting in a similar way to Nalani, Kai, and Aiden?

**Leilani:** We did.

**Mrs. Carrasquilla:** Ok, great. (*Turning to the whole class.*) Mathematicians, as you listen to Leilani and her group share, please listen to make sense of their strategy. Listening to understand others' reasoning is an important part of being in a community.

**Leilani:** We also counted leaves. We each looked for plants with the same number of leaves. I had a blue marker and I circled all the plants that have 5 leaves. Sebastian has a purple marker and he is looking for groups of 4 leaves. Kainoa has a green marker and he is circling plants with 3 leaves. (*See Figure 2.9.*)

Figure 2.9 Lailani, Kainoa, and Sebastian lean over the *'Ohana Means Family* book illustration, circling kalo plants (left). Close-up of their hands circling kalo plants using different colored markers (right)



**Kainoa:** I am thinking about the table that Kai, Nalani, and Aiden made. That might help us, too.



**Sebastian:** Yeah we need a way to organize how many plants have 5 or 4 or 3 leaves.

**Mrs. Carrasquilla:** We can hear that you are using a similar strategy of grouping and counting and that making a table to organize your counting may help. I really like the way Kainoa is thinking about Kai, Nalani, and Aiden's table and then Sebastian added on more details. Adding on is one of our talk moves—it helps us deepen our explanations and reasoning. Adding on requires us to listen carefully so we can expand others' thinking with our thinking! (*Turning to the whole class.*) What questions do you have to make sense of the strategies shared so far? Asking questions that help us better understand the reasoning is important.

*Classmates ask a few questions about the strategies that have been shared. Mrs. Carrasquilla and Mr. Lee continue to encourage student-to-student talk, orienting students to each other by physically positioning themselves to the side and with explicit support (e.g. "In our classroom discussions, you can talk directly to each other. You can ask each other questions, answer questions, and talk with each other without me calling on you."). After a bit of discussion among students about the reasoning within the two strategies shared so far, the teachers confer and decide to surface one more strategy today. They want to build a repertoire of counting strategies and hear the wide range of ways students are counting. Mr. Lee takes the lead next. He has appreciated listening to his students as Mrs. Carrasquilla took the lead and now he is ready to facilitate.*

**Mr. Lee:** Did anybody think about a different question OR solve in a different way?

*Asking "Did anybody solve in a different way?" is a common question teachers ask during Open Strategy Sharing. Since the goal of the discussions is to surface a range of ways of thinking and solving, asking for different ways of thinking allows many different ideas to surface.*

**Malia:** Our group—me, Mya, and Aukai—were trying to figure out how many plants were in the kalo field, not how many leaves. We started by talking about when we have been in kalo fields. We know that there are many, many plants and you can see in the picture, the rows go on for a long way.

**Mya:** And the plants are close together so some plants and leaves overlap.

**Malia:** Yeah, so we put a cube (*pointing to centimeter cubes*) on each plant. (*See Figure 2.10.*)

Figure 2.10  
Malia, Mya,  
and Aukai's  
counting  
cubes on the  
kalo plants in  
the illustration



**Aukai:** We started counting the cubes on the paper but then Mya said, “Why don’t we ...” and she scooted the cubes off the paper with her pencil.

**Mya:** And we said, “Oh yeah!” We pushed all the cubes off the paper and made a pile of cubes. We started counting the cubes.

**Mr. Lee:** You put cubes ON the illustration and then pushed the cubes off the page! How did that help you?

**Malia:** It was really hard to count the cubes on the page because we were accidentally moving them and counting over each other. But when Mya pushed all the cubes off the page, it made a pile of cubes. We each took a chunk of the cubes to count.

**Aukai:** We each got our totals for cubes in our piles. Then we told our total number of cubes to each other and we each added the totals together using mental math or paper and pencil.

**Aukai:** But that is where it got hard to count because when we each added the total for all the plants, we got different amounts.

**Mr. Lee:** It sounds like you disagreed with each other’s total number of cubes, or plants in the field. That is something we can do—we can disagree with people’s ideas in this classroom. We can also keep at it when problems are challenging and revise our thinking. How did you resolve this dilemma?

**Mya:** We are actually still disagreeing but we need to add a few more times and see what is happening.

*Mr. Lee and Mrs. Carrasquilla notice the time and decide they will wrap up for today. Mr. Lee thanks students and says they will continue this thinking tomorrow. A lot has happened in this Open Strategy Sharing. Mr. Lee and Mrs. Carrasquilla have had a chance to hear a range of ways students are counting and reasoning about addition and multiplication. They also got to reinforce norms, working on broadening participation and student-to-student talk and listening.*

## Open Strategy Sharing Through Children's Literature in a First-Grade Classroom

*Open Strategy Sharing* discussions are not just for older students. Let's take a look at *Open Strategy Sharing* in a first-grade classroom also located at Kamali'i Elementary School. Kumu Yoshida, a beloved first-grade teacher in the community, routinely creates math problems grounded in students' lived experiences and in connection to the topics they are studying across the curriculum in their classroom. Kumu, the Hawaiian word for teacher, is how students address their teacher in this classroom. On this day, down the breezeway from Mrs. Carrasquilla and Mr. Lee, Kumu Yoshida is also facilitating an *Open Strategy Sharing* discussion after the school-wide reading of *'Ohana Means Family*. She has mathematical and social goals for the discussion. Mathematically, she wants to support students to listen to and make sense of different counting strategies. Socially, she is focused on building classroom norms for math talk and listening with young mathematicians who are learning how to share their ideas and understand other people's ideas.

**Kumu Yoshida:** Students, you have so many questions about the story we read yesterday, *'Ohana Means Family*. (*Holding up the book and thumbing through the pages; see Figure 2.11.*) You wondered why people plant and pick kalo and what they do with the leaves, and why leaves are shaped like hearts. You wondered how old the farm is and why the people are putting the kalo roots into boxes. What else do you remember people wondered about?



Figure 2.11  
Kumu Yoshida  
holding  
up 'Ohana  
Means Family  
with children  
gathered on  
the carpet



**Sofie:** People wondered how many kalo balls or roots are in the boxes (pointing to the three boxes in the illustration).

**Kumu Yoshida:** Yes, Sofie! What else?

**Leo:** It's not on our poster, but I started wondering if the people in the farm are family or do they live together.

**Kumu Yoshida:** That is a great new wonder, Leo, and I am glad you are continuing to ask questions about this story. (Turning to the class.) I have a copy of the book for you to work with today. A question that many of you had is "How many kalo are in the boxes?" (pointing to



Figure 2.12  
Two-page  
spread in  
'Ohana  
Means Family



the three boxes in the illustration; see Figure 2.12). Your job today is to work with a few classmates to count how many kalo roots are in the boxes. We will share our counting strategies and total number of kalo roots with each other in a while.

Kumu Yoshida organizes students into small groups around the room, passes out copies of the book, and reminds students there are counting tools (such as cubes, clipboards with blank paper, pencils, colored markers) around the room for them to use if they are helpful.

As students get underway counting, she walks around the room with her *Open Strategy Sharing* planning template to make notes about what she is hearing (see Figure 2.13). She hears some students counting each kalo root by ones,

Figure 2.13  
Kumu Yoshida's  
planning  
template for  
*Open Strategy  
Sharing*

Open Strategy Sharing		
<b>Problem to pose</b> <i>How many kalo are in the boxes (the three boxes in the illustration)?</i> <i>Students will work with a few classmates to count how many kalo roots are in the boxes. We will share counting strategies.</i>		
<b>Why I chose this problem</b>	<b>Math Goal</b> <i>Support students to listen to and make sense of different counting strategies</i>	<b>Social or Community Goal</b> <i>Grounding mathematics in students' lived experiences</i> <i>Building classroom norms for sharing ideas and understanding other people's ideas.</i> <i>Using talk and listening moves to build the class's ideas and sense making together</i>

Figure 2.13  
(continued)

Opening the lesson	<p>"You have so many questions about the story we read yesterday, 'Ohana Means Family. You wondered why people plant and pick kalo and what they do with the leaves, and why leaves are shaped like hearts. You wondered how old the farm is and why the people are putting the kalo roots into boxes."</p> <ul style="list-style-type: none"><li>• Invite discussion -- "What else do you remember people wondered about?"</li><li>• Pass out copies of the book</li><li>• Reminds students there are counting tools (cubes, clipboards with blank paper, pencils, colored markers) around the room for them to use if they are helpful.</li></ul>		
How might my students solve this problem?	Who I saw solve it this way?	Share today?	
Counting all kalo by ones	Vivi & Sophie		
Counting on from one box to the next to figure out a total across the three boxes	Leo and Sofie Henry & Jasmine	Begin with Leo and Sofie	
Circling groups within boxes and then counting on	Ellis and Addie (counting by 2s) Izzie & Fiona	Addie and Ellis share third	
Notes to myself about what I'm looking for			
<ul style="list-style-type: none"><li>• Listen for how students are reasoning about the total number of kalo -- counting all using one-to-one correspondence, counting on and their sense of the number sequence, counting items in groups, etc.</li><li>• Record all answers at the beginning of the discussion</li></ul>			
Other strategies that emerged during the lesson			
Counting each kalo root by ones within each box and laying out cubes	Aiden and Aria Abby & Violet	Aiden and Aria share second	
Closing the lesson	Summarize the different ways students counted		

box by box, and laying out cubes. She hears some students counting on from one box to the next to figure out the total number of kalo root across the three boxes. She sees some students circling groups of two kalo within each box and then counting on by twos across the boxes. She hears students counting all kalo by ones and adding together the box totals. She makes decisions about which counting strategies to surface in the discussion and in which order. She is thinking about how to support students in reasoning about counting on and the number sequence, and beginning to count items in groups (such as twos). She can hear her students are ready to begin using what they know about subitizing, or seeing items in groups, to count by groupings (such as twos) and skip count by twos. This is an important insight for her understanding of students' strategies. She calls students together for a whole-group discussion. She has a copy of the book illustration to hold up for students to point and represent their strategies. She chooses to begin with counting on and to spotlight the work of Leo and Sofie. Sofie is a new class member and she wants to position her as someone with important ideas in the classroom community. Thinking carefully about which ideas and whose ideas are shared is a consideration Kumu Yoshida takes to heart.

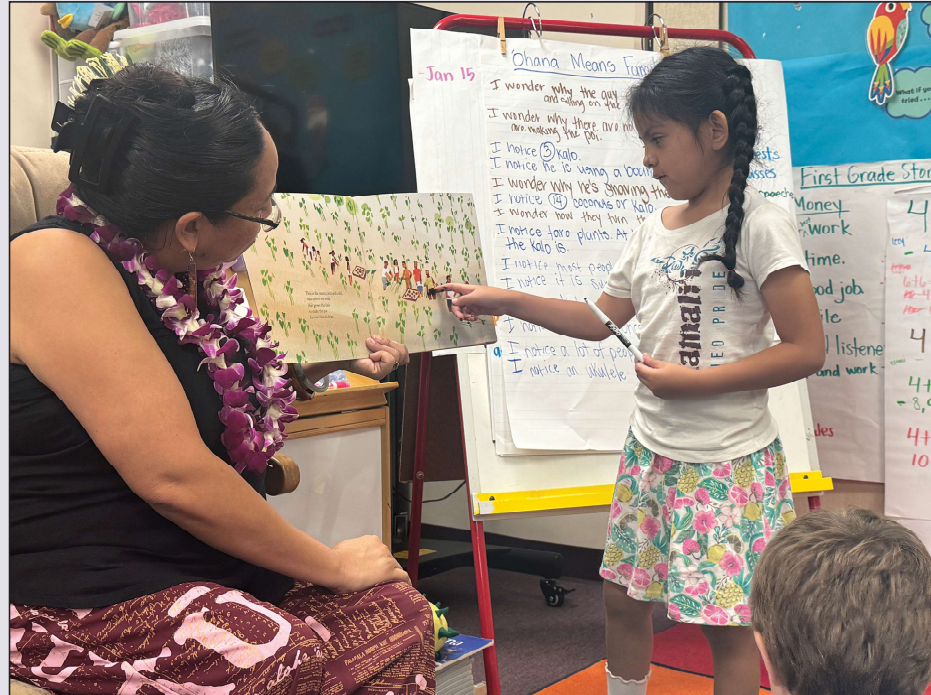
**Kumu Yoshida:** Mathematicians! You are thinking in such interesting ways about how many kalo are in the boxes. I'd like for us to come together to share the different ways people are counting through an *Open Strategy Sharing* discussion. Let's share our ideas about ways to count the kalo and listen to the ways our classmates counted similarly or different than you. First, let's get out the answers we have and I will record them. How many kalo did people count in the boxes? You can say your numbers out loud and I will write them here on our board.

**Students:** 35! 35! 36! 34!

**Kumu Yoshida:** (*Recording all the answers.*) We have different answers. Let's talk about your counting and learn more. Leo and Sofie, can you get us started? (*Talking to Sofie and Leo.*) I want you to face your classmates and to speak loudly so everyone can hear your strategy. (*Turning to the whole class.*) Our job as listeners is to hear and understand what Leo and Sofie are telling us about their counting.

*As Kumu Yoshida asks Sofie and Leo to speak loudly, she is supporting students in knowing how to share so their ideas are understandable to others. As she reminds students of their job as listeners she is also supporting students in knowing how to listen.*

Figure 2.14  
Sofie points  
to the  
illustration as  
she counts  
kalo



**Sofie:** We counted and we touched each brown round kalo when we counted it.

**Kumu Yoshida:** Can we hear what it sounded like when you counted? You can point here (*motioning Sofie to point to the illustration while she and Leo count aloud*).

**Sophie:** (*Pointing to the illustration with her finger, starting with the biggest box in the foreground of the picture; see Figure 2.14.*) 1, 2, 3 ... 14.

**Leo:** Then we went to that one (*adding on from the carpet and pointing to the next box to the left*) and we counted starting at 15, 16, 17 ... 24.

**Sofie:** Then we went to this box (*pointing to the smallest box on the left*) and we kept counting (*Leo joins in and they count aloud the final box together*) 25, 26, 27 ... 35.

**Kumu Yoshida:** Ok so we can hear that you counted all the kalo by ones and you counted on beginning with this box, and then this box, and finally this box. Your answer is 35 kalo plants.

*As the first pair shares their counting, Kumu Yoshida supports Sofie and Leo in several ways—from explicitly telling them how to speak (“speak loudly so everyone can hear your strategy”), to how to show their thinking (“You can point here”), to using the repeating talk move to*



*recap their idea so they, and their classmates, can hear again how they counted. These are ways of getting discussion going in classrooms; it is clearly directed by the teacher and generally goes back and forth between the teacher and students. This type of back-and-forth exchange can begin to show students what it means to share their thinking and allow the teacher, over time, to work toward teaching children how to share, listen, and talk with each other without it going through her each turn.*

**Kumu Yoshida:** Let's hear another strategy. Aiden and Aria, tell us about how you counted the kalo.

**Aiden:** We put a cube on each kalo and then we took them off and lined up the cubes.

**Aria:** And we counted all the cubes in the line. We got 36.

**Kumu Yoshida:** You used cubes to help you count. After you took the cubes off the page, you put them in a line and you counted them all. Class, can you gather around where Aiden and Aria are working so we can see their line of cubes? Let's count their cubes together. Aria, will you point to them for us while we count?

**Class:** 1, 2, 3, 4 ... 36.

*Counting aloud connects to other classroom math routines such as choral counting and counting collections. Counting aloud is a way to work on knowing number names and the counting sequence and is a regular part of daily life in this classroom.*

**Sofie:** They got 36 kalo but we got 35.

**Kumu Yoshida:** That is an interesting noticing, Sofie. I wonder where this difference is coming from in your answers. Let's hear one more strategy and see how it helps us count and if it helps with your noticing of different totals or sums. Ellis and Addie, can you tell us about your counting?

**Addie:** We circled 2 kalo together and then counted by twos. (See Figure 2.15.)

**Kumu Yoshida:** Ellis, do you want to add on to Addie's explanation?

**Ellis:** We started circling in this box (*pointing to the box in the foreground and circling twos with his finger*) and then this box (*pointing to the next box to the left*) and then finally this box (*pointing to the box on the far left*). But this box was a little tricky because the kalo are squished together a bit.

**Addie:** Yeah we thought these ones were squished together (*pointing to two overlapping sets of kalo in the box*).

**Ellis:** And we didn't know if this is 1 kalo or 2 kalo. We think it's 2 and 2.

**Addie:** We think there are 11 in this box.

**Kumu Yoshida:** *(Turning to the class.)* Okay, let's stop here for a moment to make sure we all understand how you see the kalo. Can you point again to where you're unsure how to count? *(As Addie points.)* Class, look closely at what Addie is showing us. Can someone repeat what Addie and Ellis are trying to figure out?

**Joseph:** In this box, the kalo are squished together *(pointing to the box furthest to the left)*.

**Halina:** It might be a kalo that is long or it might be 2 kalo.

**Kimo:** They think it's 2.

**Kumu Yoshida:** *(Turning to the class.)* I want you to turn and talk with your neighbor—what is happening when Addie and Ellis count the kalo in this box? Make sure both you and your partner share and you both listen to each other.

*Kumu Yoshida is using repeating and turn and talk to slow down the conversation and to practice sharing and listening. The turn and talk also gives her a chance to listen to the sense making about how many kalo are in the third box. As students turn to talk, students have time to reason and she has a chance to listen and decide where to go next. While students are talking, Sofie comes up to Kumu Yoshida to say she thinks sees something about why they got different answers.*

**Kumu Yoshida:** *(Pulling the class back together.)* Class, while you were talking with partners, Sofie discovered something she wanted to share with us. Sofie?

Figure 2.15 Addie circles kalo by twos



**Sofie:** We got 35 but we thought these squished kalo were 1 long kalo and now we think it might be 2, like Addie.

**Kumu Yoshida:** So you are starting to change your mind? Do you want to revise your answer?

**Sofie:** (Turning to Leo.) Leo?

**Leo:** Yeah I think so.

**Kumu Yoshida:** Sofie and Leo are revising their answer. That means they got more information and they are starting to think in a new way. Mathematicians often change their thinking and when we do that in our class we can say, “I want to revise my thinking.” Do any other pairs want to revise?

**Ali:** We do. Mia and I got 34 and we think it may be different now too.

**Kumu Yoshida:** Ok! I notice how you are listening to understand other people’s ideas and considering revising or changing your thinking when you see something differently.

*Kumu Yoshida had originally planned to close the lesson by summarizing the different ways students counted. When the conversation around revising naturally emerged, she decided to revise herself! She decided during the lesson that it was important to normalize revising ideas as a critical part of the sense making process. She closes by naming and supporting the talk move of revising thinking and offering students language to do so.*

In this discussion, Kumu Yoshida makes strategic use of turn and talks, repeating, and revising in order to broaden student participation in the discussion. Being mindful of using the talk moves in this way can keep students engaged in the conversation and build the class’s ideas and sense making together.

## What Is My Role as a Teacher When Leading Mathematical Discussions?

We can see in the vignettes in this chapter that discussions thrive when students take on active roles and their ideas are at the heart of the talk. But when discussions are student centered, teachers often wonder about their role. While the teacher in student-centered discussions may appear more like a “guide on the side” than a “sage on the stage,” the teacher’s role in leading productive mathematical discussions cannot be minimized.

For example, consider all the decisions that we saw the teachers in this chapter make. Mrs. Carrasquilla, Mr. Lee, and Kumu Yoshida made many important moves and decisions in order to reveal the details in students' strategies and to help children follow and make sense of each other's ideas. When children stumbled or got confused, the teacher normalized slowing down and persisting through uncertainty. If you glance back through the vignettes, you may notice some of the teachers' actions: they decided how to select and sequence which ideas—and whose ideas—were shared in the whole group and why, when, and how to repeat ideas being shared; they listened in during a turn and talk to think about where to go next and why; they revoiced important ideas that emerged and invited students to repeat; they provided tools to aid in thinking; they recorded and discussed all ideas; they made norms for discussion and the reasons for particular talk moves explicit; and they pointed out the importance of persisting through confusions, asking each other questions as an active listener, and the value in revising thinking. Different from modeling strategies, teachers make many decisions in order to facilitate conversation amongst students.

Reading the vignettes with an eye for the moves and decisions the teacher makes will help underscore the critical role a teacher plays in fostering productive mathematical discussions. In each vignette, the teacher is working hard to monitor what students are doing and understanding, who is engaged and how, who needs more time or different supports to stay actively thinking in the discussion and to be positioned competently. The teacher makes intentional choices about the mathematical objects and tools that are used in the discussions, how to begin and close math talk, how to assess the success of the discussion, and next steps to continue to build understanding and fluency. You may have noted additional things that a teacher is doing in these discussions. Their role is anything but passive!

## Building a Respectful Community Through Open Strategy Sharing

Building a community through discussion entails many noteworthy elements, from attention to tasks to self-reflection and student voice.

### *Finding Good Open-ended Tasks that Invite Wide Participation*

As you think about developing richer discussions in your classroom, think about what sharing and listening sounds like right now. The first thing to consider is whether your students have opportunities to work on open-ended tasks that invite multiple solutions. In this chapter, we grounded the examples of *Open Strategy Sharing* in a problem context inspired by children's literature that is deeply connected to a local school community. We encourage you to consider contexts






that are meaningful and relevant to your local school community. Whether embedded in a context or not, we encourage you to look for mathematical problems that can be approached in multiple ways. It’s especially important in fostering good listening that we pose tasks that generate ideas that are interesting to listen to. It’s vital to have problems that build your students’ understanding and investment in the norms for mathematical discussions and in the purposeful use of talk and listening moves. One way to do that is to fill your classroom with examples of home and community mathematics. Ask your students and families to regularly share and talk about the things they like to do outside of school. What mathematics is important to those everyday contexts? Encourage families to share stories, artifacts, and photographs from these contexts. Notice what community places are important to and frequented by students. What do students do at local parks and community centers, shopping centers, health centers, and sports fields? Think about what you’re studying and reading about in other subjects. In what ways might mathematical questions provide depth to understanding something new that you’re learning about?

While not specifically related to your own classroom community, your mathematics textbook will also be a good source of problems, although you may have to adjust the prompts to make sure they don’t suggest a particular way to solve a problem. Number talks, all kinds of word problems, images, or representations of data can all be good starting points for finding multiple solutions to a problem.

Here’s a list of tasks that lend themselves well to *Open Strategy Sharing*.

- **Counting activities** such as choral counting or counting collections where students share different ways to count and represent their thinking (see Franke, Kazemi, and Turrou 2018 in Appendix H)
- **Number talk images, tasks, and routines** that allow students to share how they see images numerically or spatially (see Figures 2.16, 2.17, and 2.18)

Figure 2.16 Number talk images	Figure 2.17 Math tasks and routines	Figure 2.18 Mathematizing the world routine
		

- **Quick Images**, also called dot images, are a powerful daily routine for *Open Strategy Sharing* and fostering norms for talk and listening in the classroom. To read a vignette around this routine, and view the accompanying planning tools, visit Appendix G where Mr. William's fifth-grade classroom participates in the familiar classroom routine of Quick Images. Here you can join a classroom community, gain insights into a teacher's thinking in planning for and facilitating a number talk through Quick Images, and view a planning template with Mr. William's notes and a blank planning template for your own use.
- **Computational number talks** also provide good starting points to share different arithmetic strategies.
- **Word problems** from textbooks or teacher or student-generated problems typically can be solved in multiple ways.

### ***What Does it Sound Like When Students Talk with One Another?***

Having good tasks for *Open Strategy Sharing* is necessary to capture student interest. But how the conversations actually play out depends on the discussion expectations that you cultivate and your commitment to persisting through the challenges of helping students listen and talk with one another productively. It might be helpful for you to take stock of what a discussion sounds like right now.

Here are a few exercises to try in your own classroom:

- Record a discussion for five to ten minutes. Listen to what questions you pose and how the students respond. What questions generated the most interest from students? What do you think the demands of listening and talking were for students? In other words, to be an active participant, what did students have to do?
- Invite a colleague who is also interested in deepening their discussion practice to jot notes as you lead a discussion. Look over the notes together to notice themes and consider what you may want to try next and why.
- Invite a colleague to collaboratively plan, facilitate, and reflect on teaching similar to the way Mrs. Carrasquilla (a math coach) and Mr. Lee (a classroom teacher) collaborated. Collaboration allows both a teacher and a coach to partner in decisions before, during, and after the discussion. This model provides each partner a chance to listen to children while the other takes the lead and builds collegiality. Instead of entering a teacher's classroom with the pressure of observing a "perfect" lesson, you can work together and hold joint curiosity for what students will tell you.

- Try something new. Sketch out some questions and talk and listening moves on the planning template for *Open Strategy Sharing*. Pay attention to the talk and listening moves and questions that help surface children's thinking and support students in sense making. Are there any questions or comments that may fall flat or be clunky that could be tweaked? What might that sound like? You can highlight or put a check mark by particularly helpful comments during the lesson if you're pressed for time.

## How Do Students Feel About Participating in These Discussions?

Although we are writing this book from the teachers' perspectives, giving you insight into what the teacher is thinking and trying to accomplish, it's vital to elicit how students feel about participating in mathematical discussions. While working closely with teachers to learn how to foster productive classroom discussions, we have always paid attention to how students feel about listening to and sharing ideas. After all, these discussions can be intellectually and socially risky. We want students to know that they have good ideas, that ideas in formation don't always come out in perfectly comprehensible ways, and some ideas need to be revised. How we set and maintain norms for engaging in classroom participation is important. When we asked the students we described in this book how they felt about participating in discussions and what they listen for, we heard comments like the following:

- *When I share my thinking about what I'm confused about, it helps me revise my ideas. We say, "I want to revise my thinking." I don't feel ashamed because I know a lot of people revise their thinking.*
- *Sometimes I forget my idea when I'm listening to another person, but it comes back.*
- *When I'm listening to my classmates, I think about how they got their answer. If I don't understand how they got it, I ask them to explain it again.*
- *When my classmates repeat my ideas, I'm thinking about how my idea can help other students learn. When I hear my idea repeated again, I can learn from that, too.*
- *During a turn and talk I'm thinking about what my partner said and how their math idea connects with mine.*

These types of comments can help you know whether students are taking on and buying into the norms that you want for them. We've also heard students new to discussion be frustrated if someone starts to use or build on their ideas. One student said that he didn't like it when his classmates stole his idea. Reframing for students that it's not about being the one with the idea, but that honoring each other's ideas, and building the collective ideas is our goal. The skill of learning from one another's ideas was clearly an important idea to discuss. It can feel risky and challenging to share ideas in progress, and it's not uncommon for students to quickly and sometimes unkindly correct each other. Many students worry about being embarrassed in front of their peers or are not sure how to step into a conversation. All of this can be steeped in the pressures students feel when math is perceived to be about speed and accuracy. To give you insight about how your students are feeling about participating in discussions, and how and when to frame productive norms, it might be useful to survey your students regularly about their perspectives. Their thoughts and feelings can provide good launching points for classroom meetings as you monitor how they are doing as a group. You might like to ask students to rate their feelings with statements like the following:

I like to share my math strategies in class.

**most** of the time      **some** of the time      **a little** bit      **never**

My classmates can learn from my math strategies.

**most** of the time      **some** of the time      **a little** bit      **never**

Listening to other students' math strategies helps me.

**most** of the time      **some** of the time      **a little** bit      **never**

You might also like to pose some open-ended questions like the following:

1. What does it mean to be good at math?
2. What's it like for you to listen to other people's strategies during math class?
3. How do you feel about being called on to share your thinking?
4. How do you feel about revising your thinking?

With younger students, we have found that drawing and writing or talking about pictures can provide great insight for teachers. A prompt like "Draw a picture of yourself in math class and tell me about it" can open up dialogue about being listeners and sharers. For intermediate-aged students, short surveys can provide information about students' experiences with whole-class discussions (see Appendix H).



## Summary and Reflection Questions: When Do I Want to Have an *Open Strategy Sharing* Discussion?

*Open Strategy Sharing* provides a strong foundation for mathematics discussions. It helps teachers build wide participation by creating opportunities for students to share and hear how problems can be solved in different ways. It's important to choose a task that students can make sense of in multiple ways, and by facilitating the conversation you can meet the mathematical goal of recognizing multiple valid strategies. Many classroom routines, curriculums, children's literature, and word problems lend themselves to multiple strategies. Charting multiple strategies also helps students begin to understand and build a repertoire of strategies. For example, in the *'Ohana Means Family* examples, students counted by ones, twos, threes, fours, and fives. They counted all, counted on, used addition and multiplication, and created tables to organize their thinking. Sharing these initial ideas can help students begin to think about when, how, and why these strategies work, and produce the fodder for more targeted discussions.

Socially, *Open Strategy Sharing* can help you build the norms and discussion expectations that bring to life the principles of productive mathematical talk to life. Children experience themselves and their classmates as competent. They see that their teachers are interested in their ideas, and with the intentional use of talk and listening moves, they learn what it means to hear and make sense of their own and each other's ideas, to take risks, and to revise their thinking.

We invite you to keep thinking about these questions as you move on to the next chapters:

1. What norms do I want to foster in my classroom?
2. Which talk and listening moves seem alive in my classroom? Which talk and listening moves do I want to start using or deepen in my classroom? How can I become more curious about the ways I model listening as a teacher and the ways children listen to one another? How can I make displays that will help my students and me engage as speakers and listeners in math discussions?
3. In next week's lessons, where do I see opportunities for *Open Strategy Sharing* discussions?
4. What challenges have I encountered when I have tried to support my students to share their mathematical thinking and to hear others' thinking? How could I use the talk and listening moves, or the classroom discussion expectations, to work through these challenges with students?