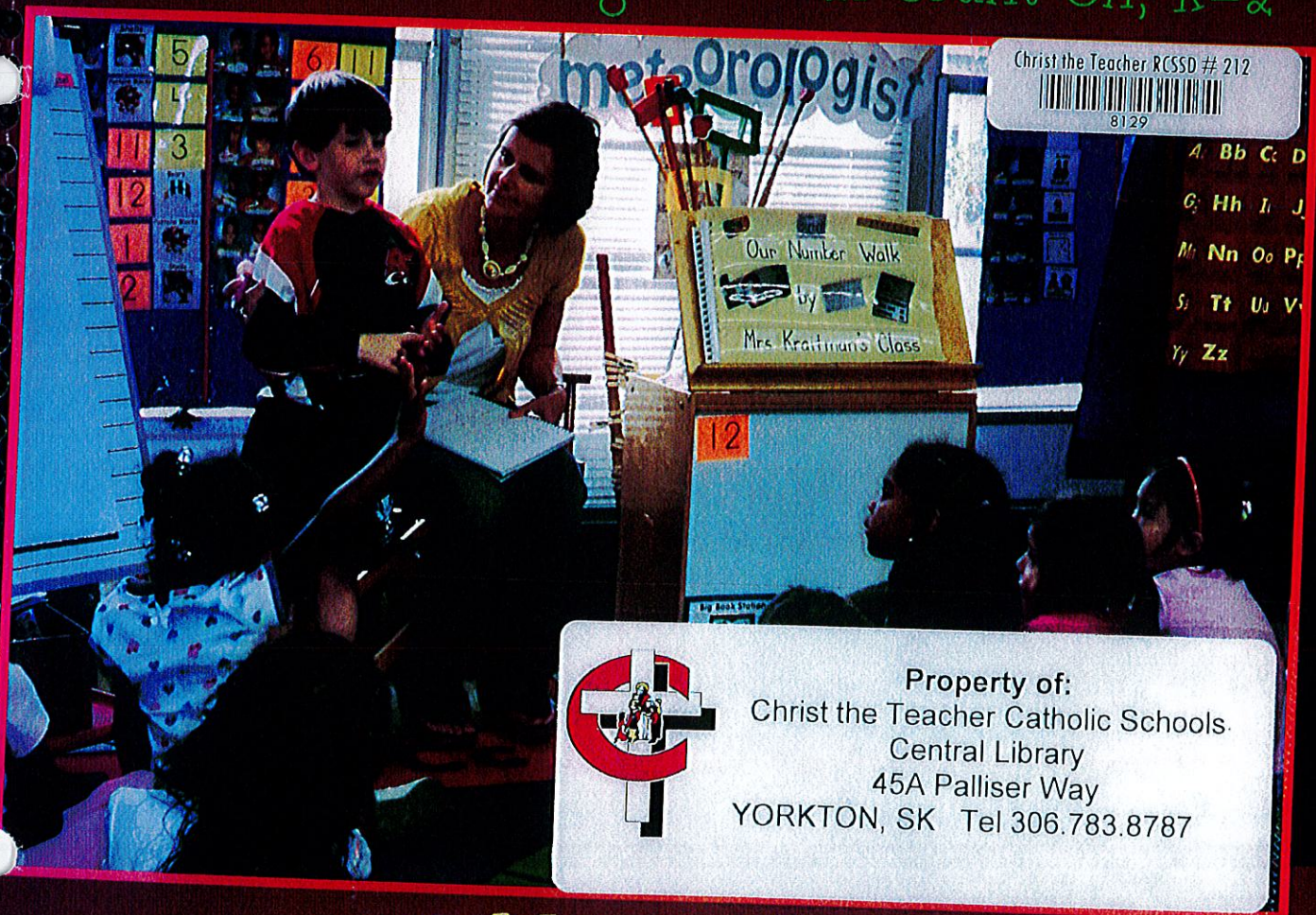




Math Work Stations

Independent Learning You Can Count On, K-2



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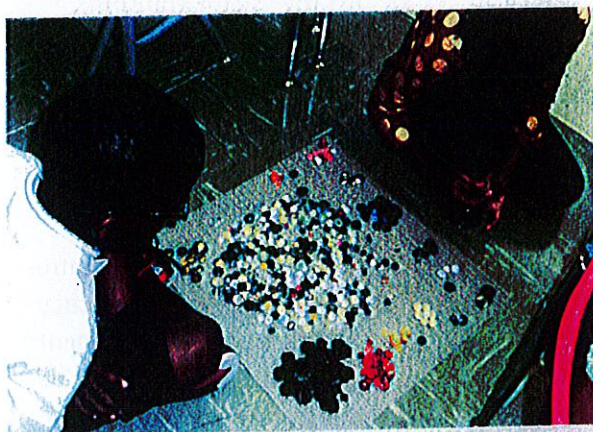
Debbie Diller

groups all year long. But if it's December or even April and you're reading this book, you can start tomorrow.

If you teach kindergarten, you may take a slightly different approach during the first three to four weeks of school. Instead of introducing math stations, I like to start with having children do exploration stations, in which they explore a different type of math manipulative each day. One day you might show the class connecting cubes and discuss what they may and may not do with them. Then let all students work with a partner using connecting cubes. On another day, repeat the procedure with teddy bear counters. Have half the students work with teddy bear counters and half work with connecting cubes (unless you have enough teddy bear counters for the whole class to use), then flip-flop. Add a new material each day (buttons, pattern blocks, wooden cubes, etc.), and by the end of a week or two there will be plenty of materials for students to explore with a partner. This isn't quite math stations, but it's a start. Exploration stations can be used for investigation of materials for the first few weeks and will be replaced by math stations as you introduce them. You might also take this approach with first graders in the first week or two of school.



Kindergarten children work with exploration stations early in the year.



After just a few days, kindergarten children begin sorting buttons at this exploration station.



By adding sorting cards and a desktop sorting circle, this exploration station with buttons is converted into math station 1.

around the chart as a border, adding more over time. If you teach kindergarten or first grade, you might post these photos beside the corresponding print describing what the photos show. This visual reminder can help students remember the behavior they will exhibit while they work on their own.

Another option is for the class to come up with three or four agreements or rules for stations time. Again, use photos for support. In a kindergarten class, the chart could be made when introducing exploration stations.

Math Work Stations Progression: A Daily Routine

Math stations usually follow a whole-group lesson for math. After you teach the math lesson, students move to their independent stations for further investigation. Don't introduce new concepts or skills and move them into a station the same day. Add the station after you've taught the concepts

over time and when you feel students are ready to use the materials and explore the ideas on their own. To facilitate student independence, many teachers find it best to use a three-step approach that I call the "Math Work Stations Progression." (See Figure 3.1.) By including all three parts of this approach, you will find that there are fewer discipline problems and interruptions when you are teaching in small group, and children will work more productively at their stations.

As needed, use a brief stations mini-lesson (suggestions follow) to show students exactly what you expect during math stations time. Mini-lessons for stations should be included daily early in the year as you introduce math stations and may be used on selected days once stations are established. Following the stations mini-lesson, students read the management board and move into math stations to work with a partner using the materials provided to expand their mathematical thinking. They usually go to one or two stations for fifteen to twenty minutes apiece. The teacher rings a bell or

Steps	Purpose	How Often/How Long
1. Math Stations Mini-Lesson	To make sure students understand exactly what to do at stations	■ Daily early in the year when introducing math stations ■ As needed to introduce/review what kids will do at math stations (possibly several days a week) ■ About 3–7 minutes per mini-lesson
2. Math Stations Time	To enable students to investigate math concepts with a partner independent of the teacher, and to enable the teacher to work with a small group or observe/interact with partners as they work at stations	■ Every day, if possible ■ 15–20 minutes per station ■ 1–2 stations per day
3. Sharing Time	To allow students to share with the teacher and their classmates what they explored and/or learned that day in math	■ Daily, if possible ■ 5 minutes max

Figure 3.1 Math Work Stations Progression

I have sometimes mistakenly assumed that I can show students something once and have them do it successfully, especially in today's classrooms, where it seems as though there's so much to teach and so little time. My experience has taught me that students often need several models and exploration on an ongoing basis when they are building understanding of a concept or learning a new skill. Fewer activities revisited multiple times at stations are more effective than having children try out a different game every other day and playing it only once or twice before it disappears.

Stations Mini-Lessons at the Start of the School Year

At the beginning of the school year, the stations mini-lessons you conduct are different from those you'll do later in the year. You might teach one of the mini-lessons suggested in the following sections daily for the first two weeks or so of school. (For more ideas, refer to the sections titled "What the Teacher Needs to Model" in Chapters 4 through 8.) Do not assume that students who have used work stations in first grade will know exactly what you expect them to do at stations in second grade.

Start mini-lessons by having students sit close to you on the floor to engage their attention. Tell them and model explicitly what you expect them to do. Then have two children role-play while the rest of the class watches. Have the observers tell what they notice. Use *familiar* materials that you've already taught with during whole-group math instruction so this lesson goes quickly. You are not teaching a concept here; you've already done that before moving this activity to math stations for further exploration and/or practice.

Here's an example of creating story problems at a math work station. Again, you would introduce this station only after you have taught several lessons to students about story problems and they are familiar with this concept. To introduce this station, model and explain to your class how they will tell,

act out, and record a word problem using the following materials:

- Story mats (preprinted or mats that children have made previously)
- Connecting cubes
- Small dry erase board and markers or class math journal

I say something like this: "We have been learning how to tell number stories using story mats and cubes. Today we will start to use these during math stations. You and your partner should choose a mat and make up a story about the place pictured on the mat." I then choose a student, Travis, to assist with the modeling in this mini-lesson and explain, "Travis and I will be partners and show you what this might look like. We'll work together and use cubes to show what happens in our story. Which mat do you want to use, Travis?"

Travis chooses the farm mat and says, "Let's tell a story at the farm. There were 4 cows." He places four black cubes on the mat.

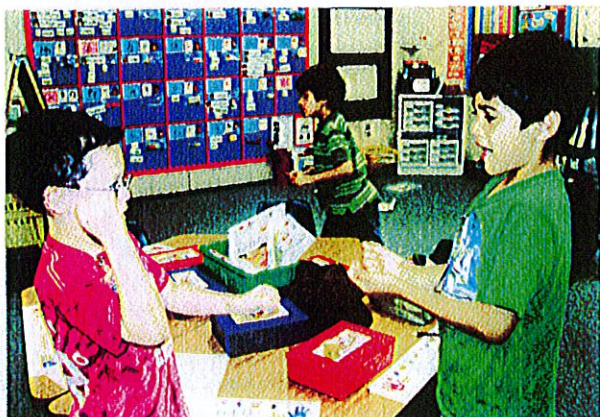
I add, "And there were 2 pink pigs," and put two pink cubes on the mat. "Together there are a bunch of animals." (Travis and I count the cubes together.) "Six farm animals are on the farm. We can write our story for others to read too."

Next, I have two other kids show the rest of the class how they would work together to tell a story, act it out, and record their word problem. These two students choose a mat with a beach scene and work together to tell a story: "Juan sees 3 blue fish," one student says. "Cedric sees 2 red fish," says the other. As they talk, they put three blue cubes on the mat and then two red cubes. Then they say, "Together they see 5 fish." They draw and write on a dry erase board to show the work they did.

When the two students are done, others give feedback and tell what they thought the partners did well. It sounds something like this: "I like the way they worked together. They didn't fight. They were nice and used quiet voices. They drew a picture

How to use the equipment/materials.

"When you use the dice, be sure to roll them on the mat. That way they won't make too much noise or roll far away." "While playing with the cards, turn them face up like this, one at a time. At the end of the game, shuffle them so they're ready to play with again." "Spin the spinner carefully. If it lands on the line, spin it one more time."

How to share materials. "There are plenty of materials, but you will have to share." "If somebody wants something that you want too, use a problem-solving strategy." "Don't take too much of something, or there won't be enough for anyone else." "Braden and Emma, pretend that you are at this station investigating patterns and you both want to use the same stamp. Show us what you would do to share the materials there."**How to take turns.** "You will be working with a partner, so you will have to take turns. Decide who will go first and who will go next. Switch back and forth. If one of you goes first in one game, let the other one go first the next time. To decide who goes first, you might play Paper, Rock, Scissors, or roll the dice. Cassidy and Joseph, please show us what it would look like if you were having trouble taking turns and solved your problem."

Two students use Paper, Rock, Scissors to decide who will go first while playing a game at a math station.

How to decide what to do at a station.

"There may be several things to do at each station. Work with your partner to decide what to do together. As a class, we will write an 'I Can' list with ideas of what to do at some stations. Read it with your partner and pick something you both want to do. If you can't agree, you might each do something different and then show each other what you did when you are finished. If there's a partner game, it will be best to play it together, though. You'll have to work it out, because if I am at the table working with a small group, I won't be available to help you. I know you will be able to figure out what to do on your own, because the ideas on the 'I Can' list are your ideas. Gabrielle and Lexi, you are partners today. Show us how you will choose what to do when you work with the counting materials at station 3."

How to solve a problem. "Sometimes a problem will come up at your work station. Maybe you are missing some pieces to a game or someone doesn't play fairly or someone doesn't want to do what you want to. What do you do? There are many ways to solve a problem. If you can't find some game pieces, put the game in the 'Missing Pieces' basket. If I'm working with a small group, you might write a sticky note telling what is missing so we can be on the lookout for those pieces. Or you can tell the class about the missing piece during sharing time. If someone isn't playing fairly or uses mean words, tell that person that his or her words or actions are hurting you and to please stop. If that child doesn't stop, you might go to your desk and write me a note so I can talk to that person after group is over. If your problem has to do with taking turns, remember the ways we have to solve that problem. If I see that two students are arguing and cannot resolve their problem, I'll have both of them sit out for the rest of the station." As part of a mini-lesson, have two chil-

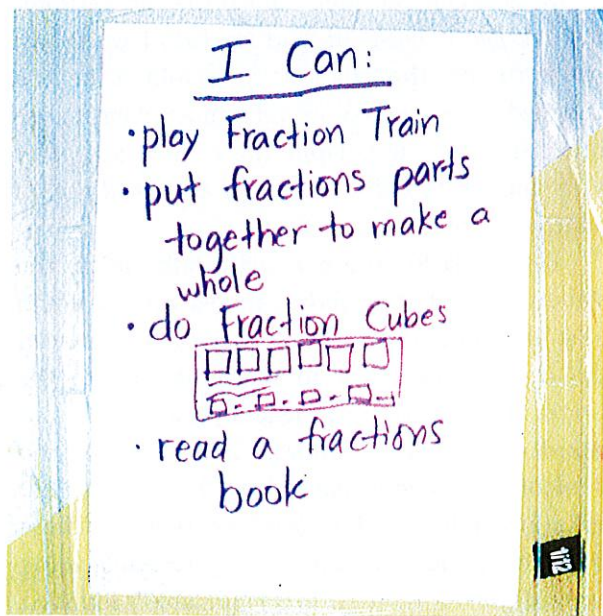
Creating an "I Can" List During Mini-Lessons for Stations

To help students focus on what to do at each station, I've often found it helpful to make a list of what students *can* do there. I call it an "I Can" list, a positive term to remind students of what they should be doing while at that station. We usually *tell* students what to do at a station, but writing it down helps them remember over time. Also, there will normally be several things to choose from at each station, so the "I Can" list reminds students of what they might do there. It may be tempting to make the list on your own after school, but you'll find that when students give their input they are more apt to use the lists to guide their work.

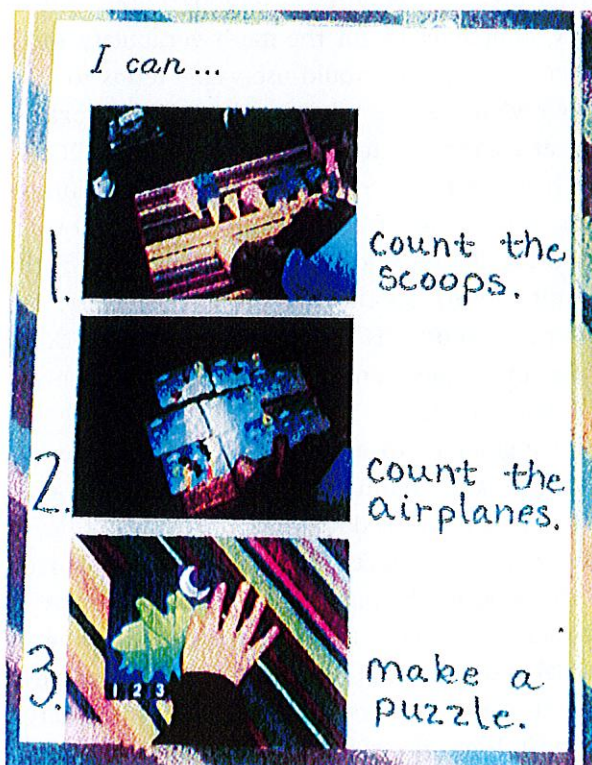
To make an "I Can" list, gather the children close to you on the carpet and show them several materials you've been teaching with that they might use at a particular station. Name each item to

"plant the seed" of what they might do there. Then give them a minute to think about what they can do while working at this station and tell them you'll write it down. Next, record their ideas on a 4-by-6-inch card or an 8½-by-11-inch piece of white paper. I like these sizes because they usually fit in the math stations container, where the list will be placed for student reference. (I often tape an "I Can" list inside the lid of the stations tub.)

Jot down students' "I Can" ideas one at a time in kid-friendly language. You might add a simple sketch or a digital photo to help students "read" and remember the list. This can be especially helpful for children just learning to read, English language learners, and autistic students who understand pictures much easier than words. Remember that you can duplicate a station. If you make an "I Can" list to go with a station that has a duplicate,



In second grade, the "I Can" list for fractions practice uses words and pictures. It is also taped to the inside of the math station lid so students can access it easily. A sample of the Fraction Cubes activity is stored in a ziplock bag with matching materials at this station. The children suggested we add this sample, because they sometimes forgot what to do with the materials.



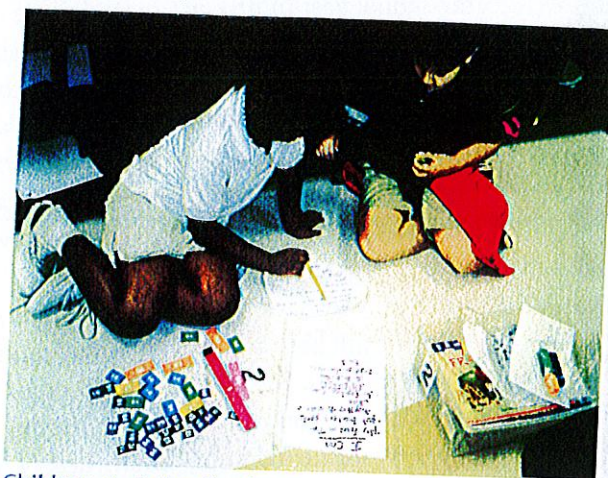
A kindergarten "I Can" list for counting includes photos and words brainstormed with the whole class. It is taped inside the lid of the math station container for easy reference.

Child 1: We'll need four *fourths* to make a *whole*.
And they're *equal parts*. (Looks at the chart and points to these words.)

Child 2: Let's write the fraction *one-fourth*. Mrs. Diller, we need to add a dry erase board to the station and some markers so we can practice writing fractions, too.

Later, as I observed students at this station, I found them using the math talk card for fractions and practicing with this academic vocabulary. In kindergarten and early first grade, you can adapt this idea by brainstorming just a few words to go with selected stations. For example, for a station about shapes, the card may say, *circle, square, triangle, round, curve, and side*. Include a picture clue to go with each word and remind students to use the picture and the first letter's sound to help them read the words on the card. Or you might want to include a simple sentence frame on the card using high-frequency words they know, such as, *This is a _____. It is _____. It has _____.*

Follow the lead of the children by asking them about the words they think they should practice. Remember that this is not a time to introduce new



Children at station 2 refer to words on the math talk card to use as they work with fractions at this station.

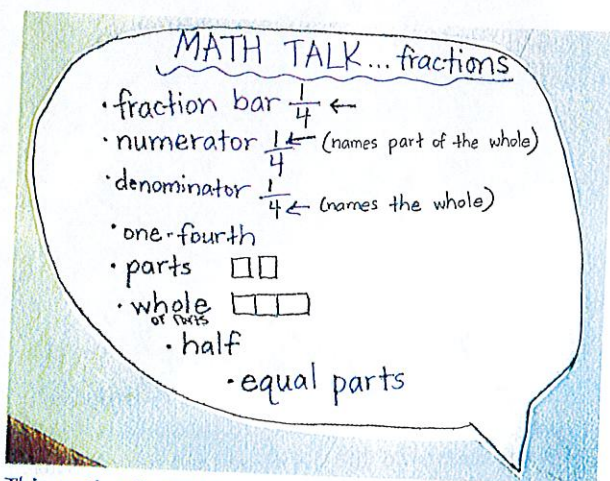
vocabulary, but a time to review what you've already taught. If you have not taught these words previously, students won't add them to the list or use them during stations time.

By adding supports like the "I Can" list and math talk cards at stations, you'll find that children's work will be more productive and focused. The addition of these supports at stations along with quality math instruction will increase rigor in the math exploration that students do. Taking the time to periodically develop these during stations mini-lessons yields great returns in the long run.

Work Stations Time

Daily, following a brief mini-lesson as needed, let students review the management board and move right into their work stations, going to one or two for fifteen to twenty minutes each. Children should know what to do and get busy right away because of the modeling done during stations mini-lessons. Remember that at the beginning of the year, while students are learning to work at their math stations, you'll want to walk around, observe, and assist students.

I recommend that you not meet with small groups for math until about four to six weeks into



This math talk card focuses on fractions, a topic the class has been studying at the end of second grade. We brainstormed this list in whole group. Drawings and arrows help clarify terms we want children to use while at a station focusing on investigating fractions. A copy of this card is put in that station for reference.



The teacher has assigned three children to this station, but only two are playing the game. The third child is supposed to be the scorekeeper, but isn't getting much of a chance to think mathematically. This station would work best for a group of two.

drummer, and seem just to work better alone. Christina was one of those kids. Some days she could be very gruff or impatient with others and would actually thwart her partner's practice. But when she was alone, she could focus better. Her teacher would watch Christina carefully and make decisions on partnering based upon the day.

Most students like working with partners, and this structure works well for math stations, especially when you use partner games from your core curriculum. Over the years, I've worked with teachers who used to have four or five students work together during this time. But as they've made the transition to having students work in groups of two, they've seen increased student engagement and focused exploration at stations.

How do I decide on who works with whom?

There are many ways to pair students. You should decide on your purposes for the grouping before making decisions on who will work together. For example, if you want students to practice activities on the cutting edge of their development—if you want them to do things that have just a little bit of challenge but are within their range of doing them

on their own—then you might pair students who work at a similar level in math and who need practice with the same concept or skill. If two children are deepening their understanding of numbers from one to five and you'd like them to work with these numbers, then it makes sense to pair *them* at a counting station rather than pairing them with students who are working with larger numbers. Two other students in this same classroom may be investigating numbers to twenty and would be more engaged working together.

Some teachers pair students heterogeneously so they can help each other. This has its place, too, at times. If you feel that a student might be able to help another child understand a concept he or she has had difficulty with, then you might pair those two children. At times, students learn better with a peer tutor. However, don't always use high-low pairing. You may find that the child who is more advanced in mathematical understanding just does the work for the student who is struggling.

Occasionally, some teachers allow students to choose their own partners. This may motivate some children because of the added choice provided. Again, there's not one right way to choose partners. Think carefully about how you set up your partners at work stations, and don't stick to only one way of doing this. Vary partners occasionally to keep interest high.

When should I change partners?

I have found that there are several times when you might want to change students' partners. If you're pairing children who are working in small group at a similar level of understanding for a math concept, then change partners if you move them into a different small group for math. Another time to change partners is if you see that certain children aren't getting along well or aren't working productively together; a new partner may help them stay on task. Finally, when students move or are absent, you'll want to help students find a new partner,

automatically clean up and get ready to transition to the next station.

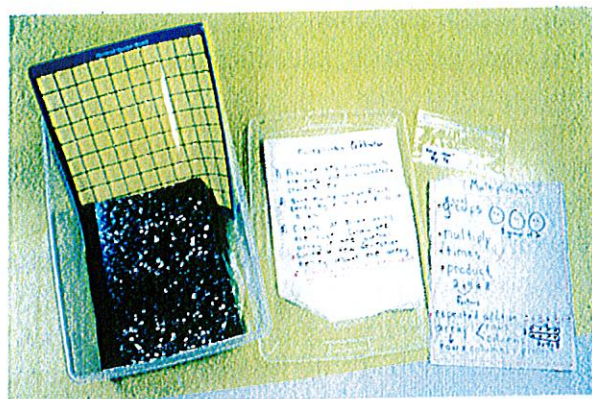
Most teachers let students work at two work stations a day for a total of thirty to forty-five minutes a day. Of course, at the beginning of the school year, math work stations time might last only ten to twelve minutes, and students might work at just one station.

My recommendation is that students use math stations most days, not just on Fridays. If stations time is part of their everyday routine, students will be more likely to know what is expected and settle to work quickly. You probably will want to observe children at stations or meet with small groups for math during this time, and it may be easier to be consistent with small-group instruction when your class is in the groove of using math stations every day. Of course, some days you might schedule a longer whole-group problem-solving session or investigation, and you will confer with individual students rather than meet with a small group. On those days, students will not go to math stations. But this is probably no more than once a week. Aim for a balance of some whole-group and some small-group instruction on most days.

Should kids write something at every math station? Where should they put their work?

No, students don't need to write at every math station. But sometimes they will use recording sheets. For example, at a station where students are solving word problems, you will want them to use numbers, pictures, and words to represent their thinking. This usually involves writing and drawing pictures. At another station where they are estimating length before measuring with nonstandard units, children will record their guesses and results. In these cases, you'll want to look at their work. It is easiest to manage if students have a special place to store stations products. There are several ways to store written work:

- If you want a central storage place to collect everybody's work, you might keep a box or



Two community math journals are placed at this "Multiplication Celebration" station (named by second graders late in the year). They create arrays and write about them in the journals.

tray labeled *Finished Work* into which students place completed products. The teacher can then simply pick up work at the end of the day to look at it.

- Or you can collect students' work at each station where you expect something written. You can have a "Finished Work" folder at each station that has a recording sheet. This way the products are already presorted.
- If you want a storage place for each individual, a pocket folder for each child works well. Students can place completed work or work in progress in the pockets of the folder.
- Or you might use community math journals at some stations where pairs of kids can record what they've done. Everyone uses this journal at this station, so there's only one journal for the teacher to look through. You'll need to teach kids to initial and date their responses if you use this option.

What if students misbehave during math work stations time?

It is a reality that children sometimes don't do what they're expected to do during work stations time. They should know ahead of time what they are supposed to do and what will happen if they break the rules. I use the "one strike and you're out" rule dur-



Two first graders clean up their materials by returning pieces to a ziplock bag and placing them in the stations tub to return to the shelf.

kids how to neatly put the pieces back in the bag and zip it up]. Then get out another game and play it. Clean it up before you read the book in this station. If you put things away as you use them, cleanup will be easy when I ring the bell to switch to the next station." Be sure to have two students model for the rest of the class what it will look like to play the game *and* clean up quickly.

When it's time to have kids switch to their second station, I've found it useful to have children "tidy up." That way the next pair of students can get to work quickly. If you have them neatly place materials in the spot where they've been working, the next partners can move there and get to work quickly. I don't expect students to put everything away and return the container to its storage spot unless nobody else will be using it on that day. When stations time has ended, then have children clean up fully and put all the materials away.

Should the children decide or should I choose which stations they will go to?

Research has shown that choice helps motivate students (Patall, Cooper, and Robinson 2008). When it comes to classroom management, many teachers do best initially giving children "controlled choices" at math work stations. It is generally easier to start the year by assigning students where you'd like them to go and eventually turning over more of the choice

to them than to begin by letting everyone go wherever they'd like and ending up with chaos.

Early in the year, you will probably only put out one activity at each station, because stations time is shorter when you first begin. Do provide choice over time at math work stations by including in each container two or three activities from which children can choose. This allows students to have some choice in a controlled way, which will help establish a predictable routine. And it prevents "early finishers." For example, when a child goes to station 5, an addition station, he or she may choose to play an addition game, read a picture book about addition using manipulatives to work out problems in the book, or write and solve an addition story problem. Don't worry if students don't get to do all these things during their first time at this station. They will visit the station more than once and will have a chance to try something else the next time. Likewise, at station 4, a place to practice graphing, there may be two different graphing games or activities from which to choose.

In one classroom I visited, the teacher had assigned only one activity for students to do at each station. She wondered why they were finishing too fast and why she was having discipline problems. When she added another choice or two within the stations, her problem with early finishers disappeared.

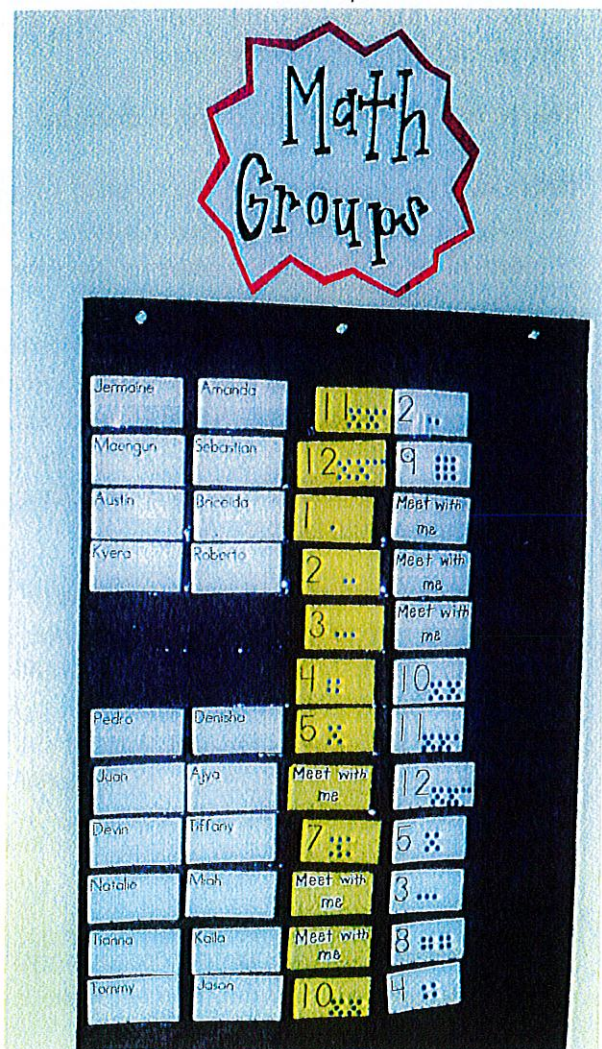
Again, teachers must know their students and what they need in order to decide which math stations children go to. Management of math work stations is a very personal teacher decision.

Management Boards

There are a variety of ways you might want to manage who goes to which work station. I've found that stations time is generally more successful when a teacher uses a management board, although some highly skilled teachers can run classrooms without them. The key is that students must know where they're supposed to be, when, and what they're supposed to be doing.

when you signal them to go to the next station. Again, the icons are simply moved down to the next row beside the next pair of names daily.

There are, of course, a variety of other types of management boards and different ways to use them. Some teachers use pocket charts and cards; others use sticky notes or magnets. The key is to find a system that works for you. I've described the



Students using this management board go to two math stations per day. The teacher is meeting with two small groups on this day. The first rotation is noted by the yellow numbered icon on the left. The white numbered icon on the right shows which station kids will use in the second rotation. The "Meet with Me" cards show which students will meet in small group with the teacher that day.



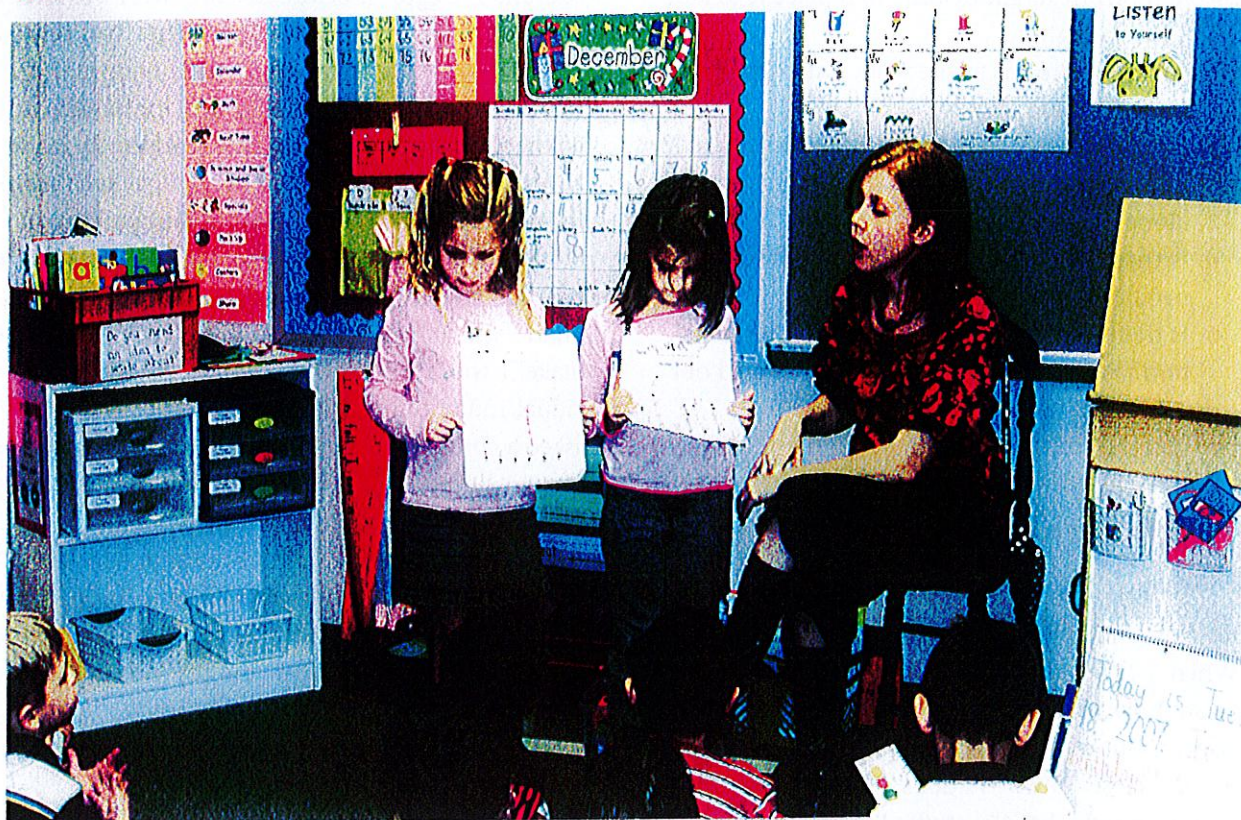
This teacher moves cards for the next day's work at math stations using a management board I created for the company Really Good Stuff. Partners' photos are on the left. Two numbered icons are to the right of each pair of kids' pictures. They read the orange numbered card to find out their first station, and go to the station number on the yellow card in their second rotation. The teacher is observing children in this class today and not working with small groups for math. The opposite side of this reversible pocket chart shows where students go for literacy work stations.

system that I've seen many teachers use easily and with success.

It's important to note that you should be flexible as you move students from one station to another. If you use a simple rotation system, as described here, you must still be flexible enough to move the icons to provide the right kind of practice for each student. Some teachers assign the first station and let children choose their second station. Find what works best for you and your class.

Sharing Time

Following work stations time, I have found it useful to have a brief sharing time with the class. This provides an opportunity for students to reflect on what they've done that day to deepen their learning. While gathered with your students on the floor,



During sharing time, two children show and tell about the graphs they made at a math station.

Solving Ongoing Problems at Math Work Stations

When students mention problems they had at work stations during sharing time, the problems can become the next day's stations mini-lessons. For example, when a student in one class told us that he couldn't find the pieces he needed for a partner game at station 4, we decided that on the following day we would, with the class, make a list of materials that should be stored in the ziplock bag holding that game. We wrote the short list (with picture clues) on an index card and taped it to the inside of the bag. Now, students know exactly what should go where. We also decided to label a plastic basket *Missing Pieces* and put it in the classroom math corner so students could place pieces that didn't belong

in their station there. Having materials easily accessible allows the teacher to work without interruptions during small-group math time.

Although good teaching should head off many problems, trouble will still brew from time to time. When a problem arises at work stations, begin by looking at what might have caused it. The first place to look is your own teaching. Ouch! I admit that I used to prefer looking at the students when there was a problem, but then I realized that the trouble at hand was often related to my instruction. Consider the following questions:

- How did I model this new task or use of materials? Did I model enough? Should I re-model?
- Have children had enough experience with the concept during whole-group instruction before I placed the task or game at a station?

some old things to make room for the new, and (2) you may have to multitask. Whenever we bring home a new piece of clothing, we need to make room for it in our closet. If we keep buying and never throw anything old away, we will soon run out of space. Our daily schedules are just like that. If we keep adding new routines but don't do away with something old, we'll run out of time in our day.

Look honestly at your lesson plan book. Put a star beside each thing your students did last week that truly helped them become better mathematical thinkers and problem solvers. Don't mark things you *hoped* would help them. Mark things that you know worked because you saw a high level of engagement, interest, and motivation. Now look at the unmarked items. What could you get rid of? Or what could you change to make it more engaging, interesting, and motivating? Perhaps it could be integrated into math work stations for further exploration or practice. An activity from your core math program that you used to do always in whole group might be moved into work stations since the class now has experience with it.

After you've gone through your daily schedule, carve out a block of time for math work stations (and small-group math instruction); usually this will follow your whole-group math lesson. Most schools allocate sixty to ninety minutes for math instruction daily. You'll need about thirty to fifty minutes of that time for math stations and small group: five to ten minutes for the stations mini-lesson (on selected days); fifteen to twenty minutes for each math station/math small group math rotation; and another five minutes for sharing. Be sure to teach math concepts in whole group and not rely just on stations to do your teaching. Math stations are for *reinforcement and extension* of concepts and skills you have already taught. Many kindergarten teachers also have a second "centers" time for traditional kindergarten centers, which might include block building, housekeeping, and the sand table, as well as the option to revisit literacy and math work stations.

Commit to trying your new schedule daily for several weeks. If you only have math stations once a week, students won't work efficiently or effectively at them. They need to have clear, predictable routines to help them learn. A special time devoted to math work stations is one of the best routines you can provide to engage your students in meaningful independent practice that will lead to better mathematical thinking and problem solving.

Reflection and Dialogue

1. Think about what math work stations time should look like, sound like, and feel like in your classroom. Be as specific as possible. You might brainstorm with a group of colleagues who teach your grade. Then try it with your class. Share their list with your colleagues. What did the students come up with that you hadn't even thought about? How did this exercise help you and your students?
2. Plan several stations mini-lessons with a colleague. Think about everything that kids might possibly *not* do right, and include those things in your mini-lessons. That way kids will know *exactly* what you expect. You might videotape a mini-lesson and share it with teachers from your grade level. Discuss how this mini-lesson helped your students.
3. Choose a math work station from your classroom that didn't go as well as planned. Brainstorm with a colleague what to do to improve upon this station.
4. Make sharing time cards for math stations (pages 224–229 in the appendix). Try doing sharing time regularly. Discuss with other teachers how the use of this reflection time is going. What are you learning from the children?
5. With your class, make an "I Can" list for one station that needs this structure and share the results with a colleague. Discuss what you learned from this experience and how you will