Chapter 1 Getting Ready to Shift Assessment Practices: How Do I Get Started?

Teacher-to-Teacher

I've been reading about the changes in mathematics education. I've read the NCTM Curriculum and Evaluation Standards *and tried to apply them in my classroom. It's a little hard, and sometimes feels lonely, without having someone to talk to.*

Now I have a copy of the NCTM Assessment Standards. *I'm really interested in what's happening with assessment because for as long as I've been teaching, the tests given in our district have had a tremendous impact on what's taugh—sometimes not for the better. I do think that we could do a better job of looking at what students learn and do in mathematics.*

I'm ready to try new ideas. What I need most to help me is more information about new assessment techniques, new ways of keeping records (where in the world shall we keep all those portfolios?), new ways of looking at students' work, and some ideas about how to get support from other teachers, administrators, parents, and the community.

I love the emphasis on problem solving but still believe we need to have the basic facts and basic skills. I also know that no one resource will give me all the answers I need—experience is the way to learn.

I'm ready to try!

Changing Assessment Practices

WHY CHANGE?

We all want our students to be "mathematically powerful," but what does that mean for assessment? Developing mathematical power involves more than simply giving students harder problems. It means asking them to focus on understanding and explaining what they are doing, digging deeper for reasons, and developing the ability to know whether they can do a better job of working on a task. For instance, part of mathematical power is knowing what it takes to succeed. Giving students information about *what* will be assessed and the *criteria* to be used in judging work is necessary to helping them do better work. We may feel comfortable and secure giving traditional tests and percent-correct grades—who can argue with the solid data of percents?—but do they help students learn and help us understand what students know and can do?

From which of these tasks in **figures 1.1** and **1.2**, for example, will we get more information about what students know?

FIG. 1.1

Which of these two fractions is larger: 2/3 or 3/2?

$\frac{3}{2}$

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Chapter Overview

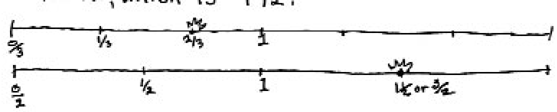
In this chapter you will learn about—

- **changing assessment practices;**
- **defining and using standards in assessment;**
- **blending instruction and assessment;**
- **the importance of assessment;**
- **getting started.**

FIG. 1.2

Explain how you would decide which of these two fractions is larger: 2/3 or 3/2. Use drawings and words.

I would say that 2/3 is smaller than 3/2 because when the numerator is bigger than the denominator that number is above 1. 3/2 is saying three halves, which is 1 1/2.



The NCTM *Assessment Standards for School Mathematics* (1995, p. 83) describes a set of shifts necessary to change assessment practices. Read the lists in **figure 1.3** and think about what classroom assessment might look like if the shifts are made.

FIG. 1.3

MAJOR SHIFTS IN ASSESSMENT PRACTICE (from National Council of Teachers of Mathematics [NCTM] 1995, p. 83)

TOWARD	AWAY FROM
Assessing students' full mathematical power	Assessing only students' knowledge of specific facts and isolated skills
Comparing students' performance with established criteria	Comparing students' performance with that of other students
Giving support to teachers and credence to their informed judgment	Designing "teacher-proof" assessment systems
Making the assessment process public, participatory, and dynamic	Making the assessment process secret, exclusive, and fixed
Giving students multiple opportunities to demonstrate their full mathematical power	Restricting students to a single way of demonstrating their mathematical knowledge
Developing a shared vision of what to assess and how to do it	Developing assessment by oneself
Using assessment results to ensure that all students have the opportunity to achieve their potential	Using assessment to filter and select students out of the opportunities to learn mathematics
Aligning assessment with curriculum and instruction	Treating assessment as independent of curriculum or instruction
Basing inferences on multiple sources of evidence	Basing inferences on restricted or single sources of evidence
Viewing students as active participants in the assessment process	Viewing students as the objects of assessment
Regarding assessment as continual and recursive	Regarding assessment as sporadic and conclusive
Holding all concerned with mathematics learning accountable for assessment results	Holding only a few accountable for assessment results

Changing Assessment Practices

WHAT KIND OF WORK DO WE WANT?

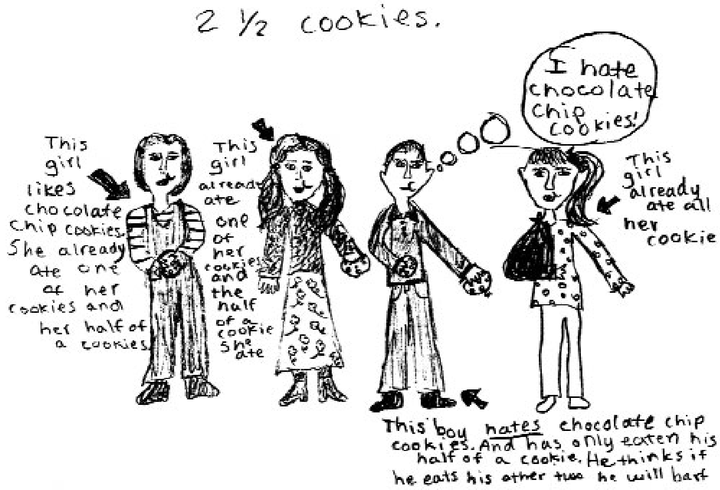
Below and to the right are two examples of the kind of work we might expect from students. These responses, although not perfect, are well communicated and thoughtful. They represent work that most students can do. In each instance, we might pursue further thinking by the children.

Julia is in third grade. She was given the task "You have ten cookies and there are four children. Explain how you would divide the cookies." **Figure 1.4** shows Julia's response. It is important that students be asked to respond in different ways. It is also important that we as teachers respond in ways that extend students' thinking. For instance, we might stretch Julia's thinking a bit by asking her, "What if each of the cookies was a different flavor?" or "What if you had eleven cookies?"

FIG. 1.4

Julia

First I drew four children. Next I took ten wooden beads to act as cookies. I started by giving each child one cookie. Then I gave each kid one more cookie. I had two left over and it wouldn't be fair not to give each child the same amount. So I decided that if I cut each cookie in half and devided the halves amonge the children everyone would have the same amount of sweets, 2 ½ cookies.



Changing Assessment Practices

Let's look at another cookie problem. Anne is in fifth grade. Her work, shown in **figure 1.5**, indicates that she may need more challenging questions than the one in this task. We might ask her whether other qualities of cookies could affect the answer (thinking of weight, thickness, density, or food value). We might get her interested in investigating number patterns that emerge if we divide different numbers of cookies among different numbers of children.

Such follow-up questions and students' responses to them tell us far more than the limited answers that we might have accepted in the past, such as "2 1/2 cookies" or "Only one can be right." Instead of looking at whether students have reached the "end of the road" by finding an answer, we want to look at how far they have come in their thinking and what we can do to help them go further.

Chapter 4 includes more examples of the kind of work that we might expect from students. Some of these examples of work are accompanied by teachers' comments.

FIG. 1.5

Paul ate 1/2 of a cookie.

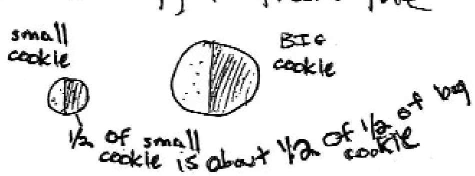
Verain ate 1/2 of another cookie.

Paul said he ate more than Verain did, but Verain said he ate more than Paul did.

Could they both be right, or could only one be right?

Use drawings, words, and numbers to explain your answer.

They could'nt both be right, because two people cant <u>both</u> eat more cookie than the other; it isn't possible. The possiblilities are either Paul or Verain ate more than the other person, or they both ate the same amount. If the cookies were the same size and they each ate 1/2 they would eat the same amount, but one cookie might be bigger than the other.



Changing Assessment Practices

WHAT KINDS OF QUESTIONS AND TASKS SHOULD WE USE?

Figures 1.6 through **1.10** show examples of assessment tasks for different purposes:

- **Figure 1.6** provides a few examples of the kinds of tasks or questions that we might think about. They begin with simple and sensible tasks.

FIG. 1.6

Here' s what I want to know:	Here' s how I might find out:
Can the students just do the basic facts?	Determine if they respond automatically to a basic fact such as 6×7 without having to stop and think.
Do the students understand what they are doing?	Determine if they can explain how they are doing a problem.
Do the students have a strategy to go back if they forget something?	Determine if they know that $3 \times 7 = 21$, so 6×7 is the same as 3×7 plus 3×7, or $21 + 21$, or 42.
Are the students learning the new skills introduced?	Spend the last five minutes of class having students write in a journal about what they have done in class. Read some of the journals each day.
Do the students give correct or reasonable answers for simple problems?	Give them the following tasks: ■ Please skip-count by 7s to 84. Use words, numbers, and pictures to explain what you know about counting by 7s. ■ Does $4 \times 13 = 52$? Use words, numbers, and pictures to explain your answer. ■ The product is 24. Show all the multiplication facts with 24 as the product. Tell how you worked on this task.

Assessment questions:

- Were the answers correct?
- Did the diagrams or pictures depict or show the elements of the problem?
- Were students able to explain how they arrived at their answers or whether their answers made sense?

- **Figure 1.7** lists questions that might be asked to determine if students understand the concept of division.

FIG. 1.7

UNDERSTANDING THE CONCEPT OF DIVISION

Do the students understand what division means?

Take 35 blocks. Use the blocks to show how to do this problem: 35 ÷ 7 =

Can the students interpret different representations of division?

For example:

- **Partitioning, or sharing—If there are 6 cookies and 2 people, how many will each person get?**
- **Measuring, or repeated subtraction—If you have 6 cookies and want each person to get 3 cookies, how many people will get cookies?**

Solve these two problems and explain how they are alike or different:

- If you divide 35 blocks into 7 groups, how many will be in each group?
- If you put 35 blocks into groups of 7, how many groups will there be?

Solve these two problems and explain how they are alike or different:

- José had 6 children at his party. How would he divide 25 cookies among them?
- Jamie wanted each child in the game to have 6 marbles. She had 25 marbles. How many children could be in the game?

Assessment questions:

- Did students distinguish between the two forms of division?
- Were their block arrangements or explanations accurate and explanatory?
- Do they understand how division by grouping and by distributing are alike and different?