forms as well as represent factors and multiples of whole numbers through 100."

Action Step 2. Write a Rubric or Scale for Each Learning Goal

Once learning goals have been established, the next step is to state them in rubric format. There are many different approaches to designing rubrics. The one presented here is explained in depth in the book *Classroom Assessment and Grading That Work* (Marzano, 2006) and has some research supporting its utility (see Flicek, 2005a, 2005b; Marzano, 2002). For reasons articulated in *Classroom Assessment and Grading That Work,* I prefer to use the term *scale* as opposed to the term *rubric*. Figure 1.9 shows what I refer to as the *simplified scale.*

FIGURE 1.9

Simplified Scale

Score 4.0: In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.

Score 3.0: No major errors or omissions regarding any of the information and/or processes (simple or complex) that were explicitly taught.

Score 2.0: No major errors or omissions regarding the simpler details and processes but major errors or omissions regarding the more

complex ideas and processes.

Score 1.0: With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.

Score 0.0: Even with help, no understanding or skill demonstrated.

The simplified scale contains five whole-point values only—4.0, 3.0, 2.0, 1.0, and 0.0—as contrasted with a more detailed scale that has half-point scores— 3.5, 2.5, 1.5, and 0.5. Although the simplified scale is generally less precise than the complete scale, I have found it a good starting place for teachers who are not familiar with using scales of this design. Additionally, in some situations half-point scores are difficult to discern or simply do not make much sense.

To demonstrate how the scale shown in Figure 1.9 can be used, assume that a health teacher wishes to score an assessment on the topic of obesity. The lowest score value on the scale is a 0.0, representing no knowledge of the topic—even with help the student demonstrates no understanding. A score of 1.0 indicates that *with help* the student shows partial knowledge of the simpler details and processes as well as the more complex ideas and processes regarding obesity. To be assigned a score of 2.0, the student

independently demonstrates understanding and skill related to the simpler details and processes but not the more complex ideas and processes regarding obesity. For example, the student knows the general definition of obesity and some of the more obvious causes. A score of 3.0 indicates that the student demonstrates understanding of the simple *and* complex content *that was taught in class*. For example, the student understands the relationship between obesity and the chances of developing diseases such as heart disease as an adult. Additionally, the student understands risk factors for becoming obese as an adult even if you are not obese as a child. Finally, a score of 4.0 indicates that the student demonstrates inferences and applications that *go beyond what was taught in class*. For example, the student is able to identify his or her risk for becoming obese and personal actions necessary to avoid obesity, even though those actions were not specifically addressed in class.

The simplified scale has intuitive appeal and is easy to use. However, measurement theory tells us that the more values a scale has, the more precise the measurement (Embretson & Reise, 2000). To illustrate, assume that a teacher used a scale with only two values—pass and fail—to score a test. Also assume that to pass the test students had to answer 60 percent of the items correctly. In this scenario, the student who answered all items correctly would receive the same score (pass) as the student who answered 60 percent of the items correctly. Similarly, the student

who answered no items correctly would receive the same score (fail) as the student who answered 59 percent of the items correctly. In general, the more score points on a scale, the more precise that scale can be. Figure 1.10 presents the complete scale.

The scale in Figure 1.10 has half-point scores, whereas the scale in Figure 1.9 does not. The half-point scores are set off to the right to signify that they describe student response patterns between the whole-point scores and therefore allow for more precision in scoring an assessment. The half-point scores allow for partial credit to be assigned to items. To illustrate, a score of 3.0 indicates that a student has answered all items or tasks correctly that involve simpler details and processes as well as all items or tasks that involve more complex ideas and processes. A score of 2.0 indicates that the student has answered all items or tasks correctly that involve simpler details and processes but has missed all items or tasks that involve more complex ideas and processes. However, what score should be assigned if a student has answered all items or tasks correctly regarding simpler details and processes and *some* items or tasks correctly involving more complex ideas and processes or has received *partial credit* on those items or tasks? Using the simplified scale a teacher would have to assign a score of 2.0. Using the complete scale a teacher would assign a score value of 2.5. The second option allows for much more precision of measurement.

The complete scale, then, is a logical extension of the simplified scale. Teachers can use them interchangeably. When

the type of assessment allows for determining partial credit, the teacher uses the complete scale. When the type of assessment does not allow for determining partial credit, the simplified scale is used.

FIGURE 1.10

Complete Scale

Score 4.0: **In addition to Score 3.0 performance, in-depth inferences and applications that go beyond what was taught.**

Score 3.5: In addition to Score 3.0 performance, partial success at inferences and applications that go beyond what was taught.

Score 3.0: **No major errors or omissions regarding any of the information and/or processes (simple or complex) that were explicitly taught.**

Score 2.5: No major errors or omissions regarding the simpler details and processes and partial knowledge of the more complex ideas and processes.

Score 2.0: **No major errors or omissions regarding the simpler details and processes but major errors or omissions regarding the more complex ideas and processes.**

Score 1.5: Partial knowledge of the simpler details and processes but major errors or omissions regarding the more complex ideas and processes.

Score 1.0: **With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**

Score 0.5: With help, a partial understanding of some of the simpler details and processes but not the more complex ideas and processes.

Score 0.0: **Even with help, no understanding or skill demonstrated.**

The generic scales depicted in Figures 1.9 and 1.10 are easily translated into scales for specific learning goals. To illustrate, consider Figure 1.11, which shows a scale for the previously mentioned 3rd grade learning goal for number sense. The scale in Figure 1.11 is basically identical to the generic form of the complete scale in Figure 1.10 except that the score values 3.0 and 2.0 identify specific elements. Although it is also possible to fill in specific elements for the score value of 4.0, I have found that many school and district leaders wish to leave this up to individual teachers. For a more detailed discussion, the reader should consult *Classroom Assessment and Grading That Work* (Marzano, 2006). When learner goals have been articulated in scale format as in Figure 1.11, the teacher and students have clear direction about instructional targets as well as descriptions of levels of understanding and performance for those targets.

FIGURE 1.11
Scale for Number Sense in 3rd Grade

Score 4.0	**In addition to Score 3.0 performance, in-depth inferences and applications that go beyond what was taught.**
Score 3.5	In addition to Score 3.0 performance, partial success at inferences and applications that go beyond what was taught.
Score 3.0	**The student demonstrates number sense by** • ordering and comparing whole numbers (millions), decimals (thousandths), and fractions with like denominators • converting between equivalent forms of fractions, decimals, and whole numbers • finding and representing factors and multiples of whole numbers through 100 **The student exhibits no major errors or omissions.**
Score 2.5	No major errors or omissions regarding the simpler details and processes and partial knowledge of the more complex ideas and processes.

Score 2.0	**The student exhibits no major errors or omissions regarding the simpler details and processes:**
	• basic terminology, for example—
	  • millions
	  • thousandths
	  • like denominator
	  • factor
	  • multiple
	• basic solutions, for example—
	  • 5.15 is greater than 5.005
	  • 3/4 is the same as 0.75
	  • 4 is a factor of 12
	However, the student exhibits major errors or omissions regarding the more complex ideas and processes stated in score 3.0.

Score 1.5	Partial knowledge of the simpler details and processes but major errors or omissions regarding the more complex ideas and processes.
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**
Score 0.5	With help, a partial understanding of some of the simpler details and processes but not the more complex ideas and processes.
Score 0.0	**Even with help, no understanding or skill demonstrated.**

Source: Adapted from Marzano & Haystead, in press.

FIGURE 1.3
Achieved Gain Associated with Number of Assessments over 15 Weeks

Number of Assessments	Effect Size	Percentile Gain
0	0	0
1	0.34	13.5
5	0.53	20.0
10	0.60	22.5
15	0.66	24.5
20	0.71	26.0
25	0.78	28.5
30	0.82	29.0

Note: Effect sizes are from data reported by Bangert-Drowns, Kulik, & Kulik, 1991.

To interpret Figure 1.3, assume that we are examining the learning of a particular student who is involved in a 15-week course. (For a discussion of how this figure was constructed, see Marzano, 2006, Technical Note 2.2.) Figure 1.3 depicts the increase in learning one might expect when differing quantities of formative assessments are employed during that 15-week session. If five assessments are employed, a gain in student achievement of 20 percentile points is expected. If 25 assessments are administered, a

gain in student achievement of 28.5 percentile points is expected, and so on. This same phenomenon is reported by Fuchs and Fuchs (1986) in their meta-analysis of 21 controlled studies. They report that providing two assessments per week results in an effect size of 0.85 or a percentile gain of 30 points.

A third critical component of this design question is the area of research on reinforcing effort and providing recognition for accomplishments. Reinforcing effort means that students see a direct link between how hard they try at a particular task and their success at that task. Over the years, research has provided evidence for this intuitively appealing notion, as summarized in Figure 1.4.

Among other things, reinforcing effort means that students see a direct relationship between how hard they work and how much they learn. Quite obviously, formative assessments aid this dynamic in that students can observe the increase in their learning over time.

Providing recognition for student learning is a bit of a contentious issue—at least on the surface. Figure 1.5 reports the results of two synthesis studies on the effects of praise on student performance. The results reported by Wilkinson (1981) are not very compelling, in that praise does not seem to have much of an effect is student achievement. The 6 percentile point gain shown in those studies is not that large. On the other hand, the results reported by Bloom (1976) are noteworthy; a 21 percentile point gain is considerable. A