\*\*Note: Remember to use Musial as reference.

Musial, D., Nieminen, G., Thomas, J., & Burke, K. (2008). Foundations of meaningful educational assessment. Boston: McGraw Hill.

CHAPTER 4 Assessment: The Link Between Standards and Learning

Chapter Objectives

After reading and thinking about this chapter, you will be able to:

• Describe the relationship between assessment and the development of understanding.

• Examine findings from cognitive science about the nature of understanding and how it relates to assessment.

• Compare different types of standards.

• Connect standards to the development of knowledge, skills, and dispositions.

• Clarify the learning and assessment implications for these different types of standards.

• Use learning outcomes to determine appropriate assessments.

The first critical question for any teacher is, What do my students need to achieve? You might think that this is an easy question to answer, but it is not. There are many factors that make this question challenging. First, because the world is always changing, it can be difficult to determine what a student will need to be successful. Also, students develop differently, and their interests and abilities make a single instructional focus problematic. Also there are a variety of expectations from different groups, some of which conflict. These conflicting demands can overwhelm educators, a challenge that will be the focus of this chapter.

Teachers and administrators are asked to respond to a wide variety of demands, such as responsibility for developing knowledgeable learners, ethical citizens, caring human beings, and competitive performers. Because all of these demands are worthy, the task of educators is to carefully determine how they will be met or modified within the environment in which they work.

This chapter shows how important it is to consider how students learn, how they come to understand important concepts, and how they develop valued skills and dispositions. This knowledge is critical in developing good assessments.

The chapter also lays out the different types of content and instructional standards developed by different groups of professionals. It describes the basis for these different types of standards and clarifies what the standards imply for instruction and assessments.

Foundational Questions for Your Consideration

• What does it mean to understand something well?

• Is understanding the mastery of a lot of facts?

• Is understanding the ability to perform tasks quickly and accurately?

• Is understanding the ability to learn quickly?

• What does it mean to think well? Is thinking a matter of logic or creativity?

• How can understanding and thinking be assessed?

• Should parents, expert professionals, politicians, or other groups determine what standards students should achieve?

• For what standards should teachers be held accountable?

The Critical Connection Between Assessment and the Nature of Learning

In Chapter 1, we showed how assessment could be thought of as placing learners in a situation that enables them to show what they know and can do. To be successful at this, you need to grasp the process by which students come to understand new ideas and skills. In fact, the National Research Council's Committee on the Foundations of Assessment states that good educational assessment is primarily based on a set of scientific principles and philosophical assumptions about how knowledge and understanding take place over time (National Research Council, 2001).

For that reason we must first clarify our assumptions about the nature of cognition or what it means for learners to understand and what it means to think. Then, we may design tasks that are compatible with our view of understanding that are most likely to bring out what learners know and can do.

Ask Yourself

Identify something that you really understand. List some reasons why you believe that you really understand it. The reasons you have identified may help you figure out what understanding means to you. For example, if you stated that you believe you understand something because you know so much about it, this would indicate that you think understanding something means that you know its many dimensions or pieces. Use your reasons and try to list the characteristics that indicate your view of understanding. Think back to the experiences or activities that helped you develop your understanding. Examples may be that you read a great deal, you practiced over and over again or in many different contexts, you observed others closely, you talked to others and they explained things to you, you asked questions along the way and tried to answer them yourself, and so on. Whatever you believe has helped you develop your understanding, these same things might help your students develop an understanding about new concepts. Describe what you would do if you wanted to teach another what you understand.

What Is Understanding?

What does it mean to understand something? What does good thinking look like? What thinking skills are important for today's society? Answers to these questions over the past hundred years have moved us from a rather simple model of understanding to a more complex model. Thanks to recent decades of research in the cognitive sciences, we now have a better sense of how to answer these questions. In fact, we now know more about how children develop understanding, how people reason and build structures of knowledge, which thinking processes are associated with competent performance, and how knowledge is shaped by social context. In the following section we describe some of these ongoing findings about understanding and thinking. We believe that these findings will help you clarify your notions about understanding and thinking so that you can apply them as you teach and assess your students.

Understanding Involves Multiple Pathways to Learning

First, we know that students arrive in the classroom with different ideas of the world and different levels of readiness. The work of Howard Gardner (1993) has brought into focus the idea that there are sets of intellectual strengths that can be considered “ways of knowing.” According to Gardner, learners tend to use several of these intellectual sets with greater agility than other sets, and he contends that educators need to honor these different ways of looking at the world. Figure 4.1 illustrates what Gardner terms multiple intelligences.

Figure 4.1 Gardner's Multiple Intelligences

While these specific individual intelligences have not yet been supported by research, they reflect in part the common observations of teachers that students can differ from one another in their learning strengths and weaknesses when they first enter the classroom. They are a reminder that you must teach broadly and assess broadly to allow students different forms of expression.

In this book we encourage you to use many different ways and many different intellectual tools to present and examine concepts. You will also need to use a variety of assessment techniques that lend themselves to different ways of expressing understanding. To fully assess students’ learning, you would not always limit them to writing, for example. At various times you would allow them to make oral presentations, group presentations, and visual or artistic presentations.

Understanding Involves Personal Meaning Making

Other psychological and social scientists approach understanding from a meaning-making perspective. According to several researchers (Caine & Caine, 1994; O'Keefe & Nadel, 1978), the search for meaning and the need to act on our environment are automatic and basic to the human brain; the mind/brain innately seeks to make connections. According to David Ausubel (1975), the search for meaning is at the heart of learning, and much of the energy and drive to pursue goals and engage in essential tasks come from this search. The central thrust of Ausubel's work is that children are always engaged in the process of making sense of things.

How do people make sense of the unfamiliar? In this view of learning, ideas are understood through the lens of culture and from the society that surrounds the individual. Ultimately, this view goes back to Lev Vygotsky (1962), who described understanding as a process involving persons in conversation. From his perspective, understanding is constructed when individuals talk about and work together on shared problems and tasks. For example, in discussion two individuals can express their unique understaning of an idea or method. In the act of sharing their understandings, the individuals may dynamically modify their perspectives by accepting or rejecting others’ ideas. Through discussion with others our own ideas become clearer.

Some of what children learn comes from being introduced into their culture by its more skilled members. This means that valued learning is knowledge that encompasses the richness of a person's context, and knowledge is subject to the values that surround the learner. So, for example, how parents introduce children to reading, or the extent to which the language of the home matches the language in the books used in school, can play an important role in helping children view reading as a form of communication and help them in understanding the world.

This personal meaning perspective implies that every assessment method is at least in part a measure of the degree to which a student's home environment does or does not support a particular assessment method. For example, some students will be better prepared than others to participate in formal assessments like multiple-choice tests, due to their histories. One way to make assessment methods or practices fairer, regardless of students’ past experiences, is to ask students to explain what a particular concept means to them in relation to their unique environment. Asking students to “give an example from your own life” or “show how this might affect you” would be useful in this way.

Understanding Requires a Large Knowledge Base

Cognitive science has gathered a large body of data about the development of expertise in various disciplines, including those we address in our classrooms. These studies have shown what learning looks like as a person moves from novice to expert in a particular area, and they demonstrate that experts become experts by amassing a large body of knowledge and skill and by organizing that body of knowledge into useful categories.

Although these descriptions of expertise are interesting, what can be done to develop knowledge and skill? Cognitive scientists have uncovered some very specific suggestions.

Opportunities for Practice and Feedback

As you have found as a learner yourself, acquiring deep knowledge and skill is long-term and labor-intensive work. A great deal of practice is necessary, but for the practice to result in real understanding, learners must have careful feedback. Learners need to know what they are doing correctly and what they are misunderstanding. They need to avoid practicing their errors and to be encouraged to acquire a needed skill correctly.

Learning from Errors

The feedback you give your students must have certain characteristics so they can learn what they need to know. First, the feedback must have specific information about what the student can do to improve (Fuchs & Fuchs, 1986). Second, the feedback must focus on mastery of learning goals rather than on giving grades or improving self-esteem. In fact, feedback to make students feel better, irrespective of the quality of their work, may be ineffective and even harmful (Kluger & DeNisi, 1996).

Understanding Involves the Organization of Schemas or Categories of Knowledge and Skills

Research has found that experts organize their information and skills in schemas, that is, meaningful units that allow them to quickly retrieve and use their large body of knowledge. As students develop their understandings, they will be engaged in this process of creating schemas. Schemas organize information on the basis of common functions or underlying features. For example, the mathematical researcher Richard C. Anderson notes that “people acquire most new mathematical knowledge by constructing for themselves new organizations of concepts and new procedures for performing mathematical operations” (1977, pp. 213–214).

Jerome Bruner (1956) has also focused on the mental structures within a person's thinking, which he calls cognitive maps. Bruner contends that all of knowledge can be collapsed into a set of abstract structures, or big ideas (such as interaction, cause–effect, equilibrium, dissonance), that should spiral throughout the school curriculum. Bruner calls these “structures” because they connect and organize all conceptual information into clearly linked maps of information.

Artificial intelligence (AI) researchers agree with Bruner that all knowing is a complex mapping process (Caine & Caine, 1994). We create mental maps by processing new experiences and placing these experiences into a maplike mental structure. Learning becomes the art of connecting bits of information in a logical way and ultimately using these connections to retrieve information about a concept whenever necessary.

The fact that learners develop schemas or cognitive maps of knowledge and skills on the way to becoming expert has important implications for assessment. Most important, you will want to ask your students to explain their thinking as they solve new problems. Their explanations will give you insight into the way in which they are organizing their knowledge and where they need help in recognizing underlying patterns or similarities.

The Importance of Metacognition

As students gain knowledge and understanding, their learning will be enhanced if they also acquire metacognitive skills. Metacognition, or thinking about thinking, includes the skills of reflecting on one's thought processes. If learners think about their own thinking as they develop answers to questions, complete learning tasks, or examine their completed works, they can develop important insights and understandings.

Although students can improve somewhat in metacognition on their own, these skills can also be taught, just like other skills. You can teach your students to monitor their understanding as they learn so that they can self-correct. You can help them figure out which strategies to use to solve a problem and why that will make future problems easier to solve. And you can help them take ownership of their learning.

Implications for Assessment

If our goal is to develop students from novices to experts, assessment must be anchored in regular, helpful feedback. Coaching students in the process of thinking and acting, conversing with students before and after a learning task, and providing guidance as they progress through a task are important assessment methods. Interestingly, we often think of such activities as teaching, not assessment.

Resource for Your Assessment Toolkit National Recommendations for Developing Assessments

The National Research Council's Committee on the Foundations of Assessment (2001) was established to review and synthesize advances in the cognitive sciences and measurement and to explore their implications for improving educational assessment. The committee contended that it was of critical importance that educators develop new kinds of assessment that better serve the goals of equity. After much deliberation, the committee determined that it was critical for teachers to study contemporary theories of learning and knowing and that teachers should explore the many different ways that knowledge is represented, organized, and processed in the mind. The committee also developed the following recommendations for assessment practice.

• Developers of assessment instruments for classroom or large-scale use should pay explicit attention to all three elements of the assessment triangle—cognition, observation (or testing), and interpretation—as well as their coordination. All three elements should be based on modern knowledge of how students learn and how such learning is best measured. Considerable time and effort should be devoted to a theory-driven design and validation process before assessments are put into use.

• Developers of educational curricula and classroom assessments should create tools that will enable teachers to implement high-quality instructional and assessment practices, consistent with modern understanding of how students learn and how such learning can be measured. Assessments and supporting instructional materials should interpret the findings from cognitive research in ways that are useful for teachers. Developers are urged to take advantage of technology to assess what students are learning at fine levels of detail, with appropriate frequency, and in ways that are tightly integrated with instruction.

• Policymakers are urged to reconsider the limitation of current assessments and to support the development of new systems of multiple assessments that would improve their ability to make decisions about education programs and the allocation of resources. Important decisions about individuals should not be based on a single test score. Policymakers should instead invest in the development of assessment systems that use multiple measures of student performance, particularly when high stakes are attached to the results. Assessments at the classroom and large-scale levels should grow out of a shared knowledge base about the nature of learning.

• The balance of mandates and resources should be shifted from an emphasis on external forms of assessment to an increased emphasis on classroom formative assessment designed to assist learning.

You may not be in a position to make assessment policy or implement assessment systems that match these noble intentions, but this resource may be valuable when you are teaching in a district that lacks some of the coherence demanded by this committee. Use this resource as evidence to support encouraging assessments that relate to a consistent view of cognition and teaching.

Source: Committee on the Foundations of Assessment, 2001.

Providing time for students to reflect on their work is also important. Regularly asking students to describe how they developed a solution to a problem rather than simply assessing whether an answer is correct or ­incorrect helps students develop a vocabulary to describe their thinking. Encouraging students to share different approaches to a problem with each other is another effective way to help students learn from their errors and from the work of others.

Ask Yourself

Think again about something that you understand clearly. What was done in school that helped you develop understanding? What got in the way of developing understanding?

What Does Thinking Mean?

According to the Committee on the Foundations of Assessment (National Research Council, 2001), it is equally important for educators to clarify both what they mean by understanding and what they mean by thinking. Just as with theories of understanding, there are many ways to consider what it means to think well.

One way to consider the meaning of good thinking is to consider thinking as a set of tools or strategies much like the tools of an artist or a carpenter. If the proper tools are not available, it will be difficult to complete the work. If the tools of thinking are imprecise or poorly developed, the final product will suffer.

Like quality tools, if thinking strategies are finely tuned, the products of thinking will benefit. For example, expert artists not only recognize the different brushes and strokes available to them but also know which brush and stroke are needed to achieve a specific effect. The same is true for thinkers using thinking tools. In addition to recognizing the variety of thinking tools available, it is equally important for thinkers to recognize that the type of thinking skill or strategy influences and determines the structure of the understanding that the learner will achieve.

To understand thinking as tools or tactics, let's first note what they are not. Thinking tactics are not simply separate thinking skills like observation, elaboration, application, analysis, synthesis, or evaluation. (Barry Beyer [1994] has identified as many as 144 separate thinking skills.) Thinking strategies or tactics are sets of thinking skills that are used together. Contemporary examples of thinking tactics include the use of a logical sequence of steps for experimentation, the use of a set of steps to write a paragraph, or the proper method for solving an ill-structured problem.

Because these thinking tactics are so important, educators must be aware of the rich variety of thinking tactics available to them. Such awareness enables teachers to be more deliberate when planning instruction and assessment.

Thinking Strategies Drawn from Dimensions of Learning

Robert Marzano provides a set of thinking strategies in his model called Dimensions of Learning (1993). Marzano contends that there is a set of thinking strategies that support the learning process. These strategies include comparison, classification, and abstraction; induction and deduction; error analysis, support construction, and perception analysis; decision making, problem solving, and invention.

Thinking Strategies Drawn from Benjamin Bloom

Benjamin Bloom (1956) provides another well-known way of thinking about thinking. Bloom proposed a taxonomy for thinking based on increasingly complex or higher-order categories. This taxonomy has been extremely influential in education for the past 50 years.

Bloom's first level, knowledge, is the underpinning of five higher levels. Bloom called the higher levels “skills.” These are comprehension, application, analysis, synthesis, and evaluation.

Recently, other educators in collaboration with Bloom and some of his co-authors have revised this taxonomy based on recent research in cognitive science (Anderson & Krathwohl, 2001). The revised model breaks the content of the knowledge category into four types: factual, conceptual, procedural, and metacognitive. The six categories are reworded with verbs to represent what a thinker is doing within that category (for instance, comprehension becomes understand). In addition, the final two categories are reversed in the revised taxonomy. You can compare the two taxonomies side by side in Figure 4.2.

Figure 4.2 Revision of Bloom's Taxonomy

Ask Yourself

Think back to a specific grade in your life as a student. What type of thinking was your teacher emphasizing in that grade? Can you recall a time when your teacher explicitly taught you any of the thinking strategies cited in this chapter? Did the assessments match the type of thinking that your teacher emphasized during instruction?

Resource for Your Assessment Toolkit Marzano's Thinking Strategies

The following types of thinking strategies were developed by Robert Marzano to help teachers relate specific questions to a specific strategy. This resource can assist you in the development of assessment questions. By considering the questions that relate to each thinking strategy, you will be clear about the type of thinking you are assessing. In fact, you could use these sample questions as they are written to inform many of your assessments.

Comparing

These questions help describe how things are the same and different.

What things do I want to compare?

What is it about them that I want to compare?

How are they the same? How are they different?

Classifying

These questions help group things that are alike into categories.

What things do I want to classify?

What things share a common likeness and could be put into a group?

What other groups can I make?

Would it be better to split up any of the groups or put any groups together?

Inductive Reasoning

These questions help make general conclusions from specific information or observations.

What do I know about this one thing?

What do I know about this other thing?

What connections or pattern can I find that they share?

What general conclusions can I make?

As I get more information, what do I need to change about my general conclusions?

Deductive Reasoning

These questions help use general statements to draw conclusions about specific information or situations.

What general information do I already know that helps me understand this topic?

In what ways does the general information apply or not apply to this topic?

What do I know better about my topic?

Error Analysis

These questions help find and describe errors in your own or others’ thinking.

What exactly is being communicated?

Does something seem incorrect or inconsistent? Why?

Does something need more clarity?

What might be added or deleted?

How can I get more or better information?

Constructing Support

These questions help provide details or elaboration for statements.

Am I stating information or a point of view?

If I am stating an opinion or point of view, do I need to offer further support?

What can I add (information, examples, evidence, appeals)?

Abstracting

These questions help find and explain general patterns in specific information or situations.

What are the important characteristics or pieces of this thing, situation, idea?

How can I say these important characteristics in a more general way?

What other things have the same general pattern?

Analyzing Perspectives

These questions help describe reasons for your own point of view and for different points of view.

What is my point of view?

What are the reasons for my point of view?

What is another point of view?

What might be some reasons for this other point of view?

Decision Making

These questions help develop and use criteria to select from among choices that seem to be equal.

What is the focus of my decision?

What are my choices?

What are the important criteria for choosing?

How important is each criterion?

What choice best matches the criteria?

Experimental Inquiry

These questions help develop and test explanations for things we observe.

What do I observe (see, touch, feel, hear)?

How can I explain it?

Based on my explanation, what can I hypothesize?

How can I test my hypothesis?

After testing, what happened? Do I need to modify my hypothesis?

Investigation

These questions help suggest and defend ways to clear up confusion about ideas or events.

What idea or event do I want to better understand?

What do I already know about this idea?

What questions do I have about this idea?

What suggestions do I have for clarifying any confusion I might have?

Invention

These questions help develop original products or processes that meet specific needs.

What do I want to make or improve?

What standards do I want to set for my invention?

What pieces make up my invention?

How do the pieces fit together? How does a rough draft look?

Does my invention meet the standards I set?

What do I need to do differently?

Problem Solving

These questions help overcome limits or barriers that are obstacles.

What is the real problem?

What are the obstacles or barriers to the problem?

What are some ways of overcoming the limits or barriers?

Which solution seems best? Why?

Comparison, classification, and abstraction are thinking strategies that examine similarities and differences among ideas, objects, and events. The focus of these thinking strategies is to identify the degree to which items reflect common characteristics. Induction and deduction are thinking strategies that are used to make conclusions and to link generalizations to specifics and vice versa. Error analysis, support construction, and perception analysis are thinking strategies that deal with the reasons for a conclusion or point of view. These thinking strategies help thinkers take a position and construct support for the position. Decision making, problem solving, and invention focus on establishing criteria, dealing with constraints and limiting conditions, and revising and meeting standards.

Source: Adapted from handout by McRel Institute, 1995.

Resource for Your Assessment Toolkit Thinking Questions Spanning Bloom's Revised Taxonomy

The following examples drawn from simple mathematics computation may help you differentiate the types of thinking that relate to Bloom's revised taxonomy. Each question relates to the addition of one- or two-digit integers, but the type of thinking required to solve each question is quite different.

Remember

Understand

a. add

b. subtract

c. multiply

d. divide

Apply

Analyze

Evaluate

Here is Susan's (requires judgment according to work. What can criteria and analysis of errors) you say about her subtracting?

Create

Write four subtraction problems to give to Susan that will test whether she can borrow.

(requires an original production for a purpose)

Standards, Standards, and More Standards: The Content Focus for Assessment

There are many, many standards in the world of education. Since the mid-1980s, educational standards have been disseminated, celebrated, debated, and revised. To make sense of the content focus that may be required in your future classroom assessments, you will find it useful to examine the many different definitions for standards as well as the sources for them. In this section we describe different ways of thinking about standards, ­different groups that have developed standards, and the different learning dimensions that make up educational standards. An examination of these fundamental ideas about standards and their origins will help you determine which standards best fit the needs of your students. It will also help you balance calls for accountability with your responsibility to connect your instruction to your students’ needs.

What Exactly Is a Standard?

Is a standard a goal? An objective? How big is it? Should it be achievable by all? For over 20 years Grant Wiggins (1989, 1991, 1998) has asked us to consider the different meanings and implications of the term standard before rushing into the standards-based education arena.

Vision of Excellence

Wiggins and others (e.g., Hammerman & Musial, 1995) have suggested that a standard should first and foremost represent a vision of excellence. Such a notion calls for a reflective process wherein experts clarify what is of most worth to a society. It implies that standards are noble goals that motivate educators to make decisions about what they emphasize in their classrooms.

At a glance, this is precisely what standards-based education has done. Teachers across the country are given lists of standards and directed to teach them and then show that students have mastered the standards. However, if standards are translated into reasonable competencies that all students should achieve by a certain grade level, they become nothing more than the behavioral objectives of old.

This does not imply that we should dismiss the importance of developing reasonable objectives to guide our daily routine, but we should realize that such objectives stand in sharp contrast to a noble goal that calls us to action. It ultimately becomes the responsibility of teachers to keep students focused on the larger goals or standards and to let these standards guide them as they help students achieve the smaller competencies that are connected to the standard.

World-Class Performance

Another meaning for standard is a world-class performance or worthy achievement. In this definition, the worthy goal is not simply an idea that motivates. Rather, the standard is encased in an empirical, real-world, expert, and summative performance that has, in fact, been achieved. Examining Olympic champions or the works of great authors, musicians, dancers, scientists, and mathematicians evokes these standards.

Once again this meaning for standard implies a noble but possibly achievable goal that motivates all of us to learn and practice and develop. Generally, when standards are based on the achievements of experts, they remain broad goals that provide an invitation to move students along a continuum. The teacher again faces the problem of determining what specific performances along this continuum are reasonable for students to achieve in their classrooms. When translated into a classroom context, we use the terminology summative performances as they would represent the culmination of a particular course of learning.

Benchmarks and Performance Competencies

A benchmark or performance competency is not a standard itself, but is a part of a standard. A benchmark or performance competency is usually defined as a discrete competency or accomplishment that shows progress toward a larger standard or goal. For example, a standard could be stated as “Students will demonstrate the ability to critically analyze competing arguments.” A benchmark of progress toward meeting this important standard might be stated as the following sixth-grade-level performance: “Sixth-grade students will compare the messages implied by two opposing political cartoons.”

Clearly this smaller, more focused, benchmark, or competency, that requests students to do a comparison relates to the larger standard that calls for critical thinking. However, the competency is smaller than the standard and represents progress toward the larger goal. The key to the proper use of benchmarks rests on the legitimate and clear connection of benchmarks to the larger standard or goal. Unless such connections are carefully developed, the benchmarks can become ends in themselves without necessarily leading to the broader standard.

How Do Expectations Influence Standards?

Standards develop from expectations that different vested interest groups have for education. For example, policymakers usually focus on the larger long-term needs of society. They tend to want more rigorous academic standards so as to maintain world-class status for this country. They want students to know more science, history, mathematics, literature, and geography than students in other countries. They expect schools to graduate students who have high-level, discipline-specific achievement and can demonstrate world-class performances. Such a view tends to emphasize standards as noble goals or worthy performances in a competitive environment.

Business leaders tend to want high school graduates ready for work—able to read, write, and compute. They expect schools to prepare a supply of future workers. Businesses are willing to provide specific job training, but they do not want to teach what they consider basic skills. The underlying conception of a standard implied by this expectation is focused on competencies or benchmarks.

Parents tend to choose standards based on their personal goals and family histories. Some parents want their children to go to prestigious colleges, and others want their children to obtain a good job immediately after high school. Still others want their children to join a particular profession. These expectations tend to focus on summative performances that relate to specific careers.

Digging Deeper The NEA Committee of Ten

In the late 1800s, the high school was added to American educational institutions. The high school was a controversial concept in U.S. culture, and the society struggled to define its purpose. Traditional educators wanted high school to be a college preparatory institution, while others wanted high school to offer practical courses for the common student. To help pave the way for high school, a curriculum standard was needed, so the National Education Association (NEA) appointed a Committee of Ten in 1892. Charles Eliot, president of Harvard, was appointed as the leader of the committee.

After much debate (similar to the debates that surround contemporary standards), a curriculum emerged that had four strands. All of the strands began with the first year covering the same five subject areas: foreign language, English, history, algebra, and what was called “physical geography,” which included geography, geology, and meteorology. Other sciences were introduced in the second year, while the other four subjects were continued.

To the modern eye, three of the strands appear to differ very little beyond the number of foreign languages learned and how many were to be ancient versus modern. For example, the Classical strand focused on Greek and Latin, with one modern language, and also differed from the other strands in its smaller number of science courses. The Latin-Scientific and Modern Language strands both emphasized sciences in addition to the basic curriculum, but no Latin or Greek was taught in the Modern Language strand.

The fourth or English strand contained only one foreign language, which could be ancient or modern, and also allowed flexibility to add more practical courses. Beginning in the second year, for example, the mathematics class could be bookkeeping and commercial arithmetic, and the sciences beginning in the third year could be replaced with “practical subjects in trade or the useful arts.”

The committee strongly recommended a common curriculum for the first two years that would introduce all students to the subjects that were seen as most beneficial in developing the student's mind and interests. As the committee explained, they wished to “give time enough to each subject to win from it the kind of mental training it is fitted to supply.”

Further, they recognized that many students might only attend the first two years of high school, so it was important to expose students to all important subjects during those two years. As they pointed out, a student needs to

discover his tastes by making excursions into all the principal fields of knowledge. The youth who has never studied any but his native language cannot know his own capacity for linguistic acquisition, and the youth who has never made a chemical or physical experiment cannot know whether or not he has a taste for exact science. The wisest teacher, or the most observant parent, can hardly predict with confidence a boy's gift for a subject which he has never touched.

Of course, it was not thought at the time that a girl would have this same focus and deliberate thought about education.

The Committee of Ten determined that “the goal of high school was to prepare all students to do well in life, contributing to their own well- being and society's good, and to prepare some students for college.”

The Committee of Ten made two important recommendations that affect schools today. First, they made high school a learning place for college-bound students and non-college-bound students alike. Second, they set the criteria concerning how many years it should take for students to complete elementary and high school educations.

Source: “The N.E.A Committee of Ten” at http://www.nd.edu/~rbarger/www7/neacom10.html. Accessed September 15, 2006.

In the end, these competing, although related, interests of different groups give rise to competing definitions for standards. This competition accounts for much of the confusion surrounding the standards-based education movement. Your mission as a teacher is to show how your students are meeting the standards by developing reasonable expectations that students can achieve at your specific grade level. As you do so, you will be working to develop a clear understanding of how the specific assessment task you use relates to other tasks that ultimately make up the larger standard.

Where Do Standards Reside?

In education, content standards reside in written documents produced by national professional organizations. Many educators and national associations think of standards as discipline based and, therefore, the property of professional, discipline-specific organizations. These subject-matter standards are statements concerning what teachers and students should know and be able to do in various disciplines: science, mathematics, history, geography, social studies, physical education, and the arts. Usually these discipline-based standards emphasize content acquisition and skill mastery; teachers are encouraged to cover subject matter and make certain that students master specific knowledge and skills.

The first group to claim that standards reside in their documents was the National Council of Teachers of Mathematics in 1989 (most recent version is 2001). Their initiative set a precedent for other standard-setting projects. During the 1990s the U.S. Department of Education funded subject-area groups and coalitions to prepare similar standards in disciplines such as science, history, civics, language arts, geography, the fine arts, and foreign language.

Standards continue to be developed and published by many groups. For example, the American Association for the Advancement of Science (1993), the National Council for the Social Studies (1994), and the National Association for Sport and Physical Education (2004) have all published sets of standards that represent what they believe students should know and be able to do throughout primary, elementary, middle, and secondary school.

These national subject-area standards have been used by most states and translated into sets of state educational standards. Individual school districts have also developed district learning standards based on their unique interpretations of state standards. You can find a list of national standards publications developed by different subject-matter groups in Appendix A.

In addition to the work of discipline-specific groups, professional educator organizations have developed standards for teachers, information specialists, school counselors, and so on. These standards articulate what educators should know and be able to do within each profession. There is no single set of teaching standards. Rather, different professional agencies have adopted their own sets. Some of these professional standards are mathematics teaching standards from the National Council for Teachers of Mathematics, science teaching standards from the National Research Council, as well as general teaching standards from the National Board for Professional Teaching Standards.

Although all of these professional teaching standards are worth examining, it is not easy for teachers to determine which set best suits their individual contexts, philosophies, and teaching styles. To do so, teachers need a clear understanding of each group's rationale for developing standards and professional reasons for endorsing one set of standards over another.

Who Sets Standards?

Conflict surrounds the question of who is setting the standards: subject-matter professionals, politicians, parents, business leaders, school districts, teachers, or students? There is also conflict concerning which of these groups should make the final decision about the standards.

As an example of this dissension, the National Council for Teachers of English, the International Reading Association, and the Center for the Study of Reading at the University of Illinois received funding from the U.S. Department of Education to draft curriculum standards in English. However, the Department of Education rejected the standards that this group proposed and terminated funding, claiming that the standards were excessively concerned with process and insufficiently concerned with products or outcomes.

Conflict over standards may also occur when two professional groups attempt to develop standards for the same area. The National Science Education Standards (NAS, 1996) was developed through federal funds by the National Academies of Science and Benchmarks for Science Literacy (1993) was developed by the Association for the Advancement of Science. Both exist as independent sources for science teaching.

Some educators argue that different sets of national standards are useful because they lead to a critical discussion that will help in selecting standards. Healthy conflict allows for change and guards against developing an inflexible set of standards. Others note that in the absence of a single set of national standards, schools are left in the precarious position of choosing their own sets of standards that will impact what their students will know and be able to do at the end of their public schooling experience.

How Do States Interpret and Use the Standards?

In addition to conflicts among professional groups, conflicts arise about the uses of the standards across different states. Each of the 50 states has developed a standards framework that interprets the national standards for use within that state's schools. These state standards provide the key content that is the focus of every school district within that state. Recently, with the passage of No Child Left Behind, as we explained in Chapter 3, these standards are also used to develop large-scale assessments that are administered annually to provide accountability information to the public.

A standards framework is a structured description of how standards fit both larger learning goals and smaller benchmarks or performance competencies. An example of one state's standards framework in the area of science standards is illustrated in Figure 4.3. Science Standard 1 is broad, encompassing virtually all of the fundamentals of life sciences: “Students will understand the fundamental concepts, principles and interconnections of the life sciences.” Next, this state's Board of Education took a smaller part of that standard and termed it Science Goal 1: “Know and apply concepts that explain how and why living things function, adapt, and change.” This is one of a number of goals that would be needed to encompass the breadth of Science Standard 1.

Figure 4.3 Science Standard 1

As the next step, the state Board of Education created a series of benchmarks within the goal, describing how the goal might look at each level of development—from early and later elementary perspectives, a middle school perspective, and early and later high school perspectives. Two benchmarks for each of these five levels are shown in Figure 4.3. And finally, a state test was developed and administered to all students at certain grade levels to see how well they perform on this standard.

Figure 4.3 provides a very neat-looking summary of Science Standard 1 and one of the state's science goals that flows from Science Standard 1. But how well do the ten benchmarks really cover the goal? The benchmarks mention life cycles of plants and animals, but what about other kinds of cycles? Genetic variation is covered, but what about the relationship among DNA/RNA, genes, chromosomes, and ultimately the cell? The component parts of cells and the requirements for cells to live are covered but what about the death of cells and how the death–life cycle forms systems? This analysis is not intended to criticize a particular state but to illustrate the narrowing process that takes place as states attempt to translate broad standards into tests to determine if students are meeting those standards.

Furthermore, looking at the state test items, we can see that what was once a broad standard is now reduced to something much smaller. For practical reasons, a statewide test will naturally have to be made up of objective questions, similar to the way standardized tests are given in schools across the country. How well can these small, focused test questions truly assess students’ mastery of the standard in all its breadth? When you compare the breadth of the standard (“Understand the fundamental concepts, principles, and interconnections of the life sciences”) to the small-focus questions that supposedly test it, you find that fundamental concepts have come down to questions about skin and the parts of the cell.

Not surprisingly, what happens over time is that teachers, while using these standards frameworks, begin to concentrate more and more on the tiny parts of each benchmark that match the state tests. Rather than expanding their curriculum to broaden the coverage in science beyond the small objectives listed for them, they are pressured to make sure their students pass the state tests. And the people who now set the standards are not the politicians or the professionals of various disciplines, but rather the state test writers (in some cases, a for-profit corporation). In a sense, the testing company, rather than the standard, is determining the curriculum.

The key response by teachers should be to interpret benchmarks and performances on tests in light of the larger standards that give rise to the benchmarks. There is much that surrounds these benchmarks and it is a challenge for teachers to determine all the related content so that the overall standard is being met rather than a limited number of objectives. This means that teachers must constantly return to and reflect on the larger learning standard, continue to read about the standard, and view it from the position of national standards documents—the position of working scientists and other experts as they develop new knowledge.

It is important for teachers to understand the standards framework for their state as well as the district curriculum that supports this framework. You can access your state's standards framework through a helpful service link provided by Education World at http://www.education-world.com/standards. Your state's standards framework will show you how national standards are interpreted by your state. Even if the terminology is different than that used in this book, you will find that the structure generally goes from standards, large learning goals, or outcome statements, to smaller benchmarks, performance competencies, or objectives.

What Unintended Consequences Have Come from Standards-Based Education?

The national movement toward standards is having both positive and negative effects on schools. On the positive side, the standards education movement provides a vocabulary and more precise information about what different school districts and states value. Standards also have the potential to make learning expectations clearer and more consistent across state lines. Standards aid students in understanding what is most important to learn, and they help teachers, schools, school districts, and states in determining the learning outcomes that should be assessed.

Still, as with any education initiative, there are a number of unfortunate, unintended consequences. We highlight below several of the more important consequences that have direct impact on teachers and students in classrooms.

High-Stakes Testing

As the focus on student performance has increased, policymakers, especially at the state level, have mandated that students be tested regularly. Federally mandated annual testing of students under NCLB is now in place. Student test results are regularly compiled by schools and reported to the public. Schools are often named and ranked in newspapers, which raises sharp questions about the “low-performing” status of certain schools. In a few states, “high-performing” schools receive additional funds.

Much more frequent than rewarding schools is some sort of sanctioning of low-performing schools. In some states, schools that are designated “in crisis” are assigned an experienced master teacher or principal who is responsible for helping the school improve. Principals can be reassigned and school staffs replaced. In other states, entire school districts designated “low performing” can be taken over by the state.

Tests can be high stakes for students as well. Twenty-eight states now use standardized exams to determine graduation from high school, and 19 states use tests to decide student promotions.

Teaching for the Test

A related unintended outcome has to do with the time teachers spend on topics “likely to be on the test” rather than addressing the specific instructional needs of their students. Any single test samples only a very limited part of what students need to learn. Some state tests have little overlap with what is specified in various sets of content standards and what is emphasized in the district curriculum materials. Time spent preparing for high-stakes tests reduces the time available to teach related material and other subjects, such as art and music, which are often not tested (National Education Commission on Time and Learning, 1994).

One Size Fits All

Another critical issue related to the heavy focus on testing is the assumption that the same test is appropriate for all students and schools. In 1980 just about half of the states had mandatory testing programs. By 1998 all but two states had some type of mandatory state assessment. Historically, in the American system of education, heavy emphasis has been placed on the importance of attending to individual and developmental differences. As noted above, some states mandate that one test be given to all students at a certain grade level at a specified time; in other words, one size fits all. All students are required to take the same relatively narrow test, and major decisions about individual students and/or schools are often based on the test results.

A National Exam

Some educators are concerned that the adoption of national curriculum standards and state tests will lead to a national exam and subsequent national curriculum (Pipho, 2000). This is the one-size-fits-all concept taken to the extreme.

It is interesting to note that at present there exists a sort of national exam that is given strictly for statistical purposes, not to grade individual schools, school districts, or states. This is the National Assessment for Educational Progress (NAEP), discussed in Chapter 3, which is administered each year to students in a representative sample of schools in each state. The test makes it possible for policymakers and educators to view how well students are doing across the nation as a whole and to make comparisons with student achievement in other countries. Also, because of the way the data are gathered, NAEP results can be used to make inferences about student achievement within states and thus to compare one state with another. Ironically, although NAEP has existed for several decades and its findings have been useful to educational planners because they are strictly anonymous, school districts are increasingly unwilling to participate in the testing due to the mounting pressure and time demands of the many other required tests.

What Do Standards Imply for Assessment?

Finally, let's consider the question of how assessment relates to standards. In many states it is assumed that once a standard is officially selected, teachers should be held accountable for students’ achievement of the standard. This assumption is seriously flawed. World-class standards or standards as noble concepts are meant to lead students and teachers to higher and higher levels. Focusing on the mastery of small competencies without making an effort to fulfill more of the broad standard makes for piecemeal development rather than reaching deeper levels of knowledge and understanding.

For this reason, accountability itself needs to be debated and better understood. To whom or to what should teachers and students be accountable? Are standardized multiple-choice tests appropriate assessments for standards? How can we be sure that the competencies we are assessing are big enough pieces of the standards and important enough to assess?

Despite all of these difficulties concerning the proper way to assess standards, teachers can still make a difference for their students by developing clear, classroom-based assessments that are closely linked to standards. The key is that teachers need to be well-informed about standards. They need to access the different sources for standards and not rely simply on statements provided by state standards frameworks. Teachers need to study the connections between the goals and standards and the concrete benchmarks that relate to the larger standards.

n addition, rather than simply relying on multiple-choice tests (which are generally used in state and national assessments), teachers can develop a variety of classroom assessments to measure the knowledge, thinking strategies, and dispositions that are implicit in the standards. Portfolio development, performance assessments, authentic assessment projects, interviews, and observations are just a few of the types of assessments that may be able to focus on the broad standard rather than on limited answers to smaller questions. Assessing students through a variety of assessment methods that complement one another enables both students and parents to know more clearly what students know and can do. The next section of this chapter will help you better understand how to keep your focus on the larger standards of instruction while concentrating on the specific developmental levels of your students.

Ask Yourself

Take a look at a standard from one of the published national standards documents. Then consider how a world-class professional might perform the standard you selected. Compare a published standard with your understanding of the world-class version. What insights does each description provide? Does either the written version or the world-class performance version seem more useful to you as a teacher, or do you find unique insights from both versions? How might students at a particular classroom grade level display the same standard in a performance task? In what ways does the classroom task relate to the written and world-class versions? In what ways does the classroom task differ from the written and world-class versions?

Three Dimensions of the Instructional Process: Standards, Learning, and Assessment

The instructional process involves three basic components: standards, learning, and assessment. In other words, it involves clarifying students’ learning outcomes (linked to important standards), providing learning activities that help students master the intended outcomes (linked to the teacher's views about understanding and thinking), and, finally, assessing students to determine if they have achieved the learning outcomes. You might think that these three steps are linear with step one preceding step two, and step two preceding step three. But this is not the case. In fact, the instructional process requires you to carefully consider all three steps simultaneously because each of these components influences the others (Figure 4.4).

Figure 4.4 Three Dimensions of the Instructional Process

The figure displays the dynamic relationship among the development of learning outcomes, the selection and implementation of learning activities, and the design of assessments that match both the learning outcomes and the learning activities. However, Figure 4.4 also shows how each of these activities is linked to larger foundational considerations, indicated in the colored ovals.

For example, it is not enough to simply take a learning objective and teach it in isolation; it must be connected to its corresponding standard. It is not enough to simply develop a teaching activity; it must be connected to the specific learning needs of the students and to the larger view of understanding that the teacher holds. Finally, it is not enough to purchase a commercially developed assessment tool or to write a test without considering the many ways students might know and be able to communicate their understanding.

Because the process shown in Figure 4.4 is cyclical, you can theoretically start anywhere. Let's start with developing the learning outcomes or objectives. As you work on this task, you will use the curriculum goals adopted by your school board, but you will also reflect on the broad standards that the goals are part of, asking yourself, “Is part of the standard missing from our written goals? What and how can I teach so that I meet the goals and at the same time deepen my students’ understanding of the larger standard?”

After clarifying the learning outcomes, you develop learning activities that will accomplish your learning outcomes. Again, you will find yourself reflecting on some important issues: your understanding of the nature of learning, your personal views about cognition, and the unique needs of the learners in your classroom.

And having administered your assessments and evaluated your students’ performance, you are in a position to modify or extend your learning objectives. You may broaden your learning activities to address areas of misunderstanding, and you may broaden your learning activities to deepen your students’ understanding or to include activities that relate to students’ interests.

Constructing Learning Outcomes that Match Standards

In order to design appropriate assessments, teachers need to state learning outcomes or objectives that clearly convey the focus, that is, what it is that students are to learn. Only when you have developed learning outcomes that clearly connect to the standards and also fit the unique needs of your students can you develop clear assessments. Assessments should always relate to the intended standards and to the specific ways that your students learn.

Specifically, how can you clarify a learning outcome and be certain it matches the larger standard? An initial important step to accomplish this is unpacking the standard: breaking the larger goals and standards of your curriculum into the key ideas and skills stated in the standard. Focus on the vocabulary of the standard and examine the terms and concepts. Consider how this vocabulary connects to the content of your grade and other grade levels. Talk to teachers about the concepts and terms of the standard and find out how they introduce these terms to students. What learning tasks are student provided that link to the standards? By analyzing these tasks, you can develop similar tasks that connect to those learning tasks that students have or will have experienced in other grade levels (Burke, 2006).

Another key step that you can use to determine if a learning outcome matches the larger standard is to determine the big ideas or essential questions that are often embedded across related standards. Susan Drake and Rebecca Burns (2004) believe that teachers can find these big ideas and questions by using an integrated approach to the study of their curriculum. Teachers often start a unit of learning by focusing on a topic like dinosaurs, medieval times, butterflies, or the Civil War. It is important for teachers to see the big ideas or concepts that relate to these topics and focus the learning on the related ideas. For example, dinosaurs include the concept of extinction, medieval times includes culture, butterflies include life cycles, and the Civil War is permeated by the big idea of conflict. It is the big ideas that need to be the focus of standards-based learning, rather than the specific topics.

Ask Yourself

Recall a teacher that you believe really helped you learn. What types of instruction did the teacher use that seemed especially effective? Why do you think these instructional methods were so effective? What types of assessments did the teacher use? Did these assessments match the types of instruction that were employed?

Summary

• Every assessment is grounded in assumptions about the nature of cognition or what it means to understand and what it means to think. It is imperative for teachers to clarify what they mean by understanding and thinking.

• Understanding is a complex concept that includes multiple pathways to learning, personal meaning, the development of schemas, and cognitive maps.

• Allowing students to learn from error—providing opportunities for practice and feedback—helps develop understanding.

• Providing time for students to reflect on their learning is important for understanding.

• There are different views about the nature of thinking, including Marzano's dimensions of learning and Bloom's taxonomy of thinking.

• Standards can be thought of as a vision of excellence, a world-class performance, or a benchmark.

• Standards reside in the ongoing excellent work of professionals, in national documents developed by professional organizations, and in state and local school district documents.

• Some unintended consequences that surround teaching for standards are high-stakes testing, teaching for the test, and the threat of a national examination.

• Assessments need to match the intentions of standards and should not simply measure the test items of high-stakes testing.

Key Terms

benchmark or performance competency (90)

cognitive map (81)

meaning making (79)

metacognition (81)

schemas (80)

standard (89)

standards framework (94)

thinking strategies or tactics (83)

unpacking the standard (101)

For Further Discussion

1. What types of school experiences really helped you understand a concept or a skill?

2. What types of assessment really made you think?

3. What types of feedback did you receive in school that helped you correct a misconception or provided you with information about what you needed to learn next?

4. Share an example of a learning benchmark that your teacher emphasized. Did your teacher clarify how this benchmark or learning objective matched a standard?

Comprehension Quiz

In each chapter, we provide a short review of some key ideas in the form of an assessment. The use of these formats can remind you of the way that the format of an assessment changes your response to the experience. For this chapter, we have chosen a multiple-choice assessment. We hope you enjoy the review.

Part One

Select what type of standard matches each example.

a. Vision of excellence

b. Benchmark

c. Summative performance

1. Martell has completed her student teaching semester at a rural high school. She receives high ratings on her student teaching competency checklist.

2. Ricardo correctly answers all questions about adding two-digit numbers with no regrouping.

3. Karen receives a letter from the Westinghouse Foundation that her research on the characteristics of a specific protein and its effects on tumors has been selected as an example of outstanding research.

4. All 17 students from first grade can recite the alphabet without error.

Part Two

What type of assessment closely fits the following learning objectives?

a. Multiple-choice short-answer or test

b. Essay question

c. Performance assessment

1. Learners will be able to analyze the causes of the Revolutionary War.

2. Learners will be able to list the three components of the instructional process.

3. Learners will be able to collect firsthand data, develop a data table, and infer a conclusion from the data they collected.

Relevant Website Resources

American Alliance for Health, Physical Education, Recreation & Dance

http://www.aahperd.org

Formed in 1885, the American Alliance for Health, Physical Education, Recreation & Dance (AAHPERD) comprises five national associations and six district associations promoting a healthy lifestyle through physical activity. The AAHPERD developed standards for physical education and related areas, and the site provides material for lesson plans, professional development, and publications.

American Association for the Advancement of Science

http://www.aaas.org

The American Association for the Advancement of Science (AAAS) was founded in 1848 and is dedicated to advancing science around the world through education and leadership. One of its projects is Project 2061 that sets out recommendations for what all students should know and be able to do in science, mathematics, and technology by the time they graduate from high school.

International Reading Association

http://www.reading.org

The main goal of the International Reading Association (IRA) is to advance the literacy movement for people of all ages locally, nationally, and worldwide. For more than 50 years, IRA has provided research, publications, advice, and lesson plans to educators of all types, including professors, teachers, and parents. The IRA also posts news articles regarding literacy and related issues. Grants and award opportunities are available for qualifying teachers, programs, and educational institutions.

National Academies and the National Research Council

http://www.nationalacademies.org/nrc

Founded in 1916 by the National Academies, an umbrella organization for the National Academies of Sciences, National Academy of Engineering, and Institute of Medicine, the National Research Council (NRC) provides services to government entities and to public, scientific, and engineering communities. The NRC developed the national standards for science education and many other publications about the science of instruction and assessment. The site offers access to these resources.

National Arts Education Network (ArtsEdge)

http://artsedge.kennedy-center.org/teach/standards.cfm

ArtsEdge is a National Arts Education Network that supports the placement of the arts at the center of the curriculum and advocates creative use of technology to enhance the K–12 educational experience. ArtsEdge offers free, standards-based teaching materials for use in and out of the classroom as well as professional development resources, student materials, and guidelines for arts-based instruction and assessment. The site provides access to the national standards for arts education developed by the Consortium of National Arts Education Associations.

National Council for Teachers of English

http://www.ncte.org

Founded in 1911, the National Council for Teachers of English (NCTE) provides a website full of information and resources on the subject matter of English. There are state standards listed, along with professional standards. NCTE also offers professional growth through local and national conferences.

National Council for Teachers of Mathematics

http://www.nctm.org

The National Council for Teachers of Mathematics (NCTM) offers a website with access to national standards in mathematics instruction and teaching, instructional resources, and professional development opportunities.

National Council for the Social Studies

http://www.socialstudies.org

The mission of the National Council for the Social Studies (NCSS) is to provide leadership, service, and support for social studies educators. The site offers resources for lesson plans, teaching activities, and professional development. Membership is needed to access full benefits for the NCSS website.

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