

Understanding by Design

by Grant Wiggins and Jay McTighe

Introduction

Consider the following four vignettes and what they suggest about understanding and the design of curriculum and assessments. Two are true. Two are fictionalized accounts of familiar practice.

Vignette 1

As part of a workshop on "understanding," a veteran high school English teacher entered the following reflection in a learning log about her own experience as a high school student:

I felt then that my brain was a way station for material going in one ear and (after the test) out the other. I could memorize very easily and so became valedictorian, but I was embarrassed even then that I understood much less than some other students who cared less about grades.

Vignette 2

For two weeks every fall, all the 3rd grade classes participate in a unit on apples. The students engage in a variety of activities related to the topic. In language arts, they read *Johnny Appleseed* and view an illustrated filmstrip of the story. They each write a creative story involving an apple and then illustrate their stories using tempera paints. In art, students collect leaves from nearby crab apple trees and make a giant leaf print collage on the hallway bulletin board adjacent to the 3rd grade classrooms. The music teacher teaches the children songs about apples. In science, they use their senses to carefully observe and describe the characteristics of different types of apples. During mathematics, the teacher demonstrates how to "scale up" an applesauce recipe to make a quantity sufficient for all the 3rd graders.

A highlight of the unit is the field trip to a local apple orchard, where students watch cider being made and go on a hayride. The culminating unit

activity is the 3rd grade apple fest, a celebration for which parent volunteers dress as apples and the children rotate through various activities at stations—making applesauce, competing in an apple "word search" contest, bobbing for apples, completing a math skill sheet containing word problems involving apples, and so on. The fest concludes with selected students reading their apple stories while the entire group enjoys candy apples prepared by the cafeteria staff.

Vignette 3

A test item on a national mathematics assessment presented the following question to 8th grade students:

"How many buses does the army need to transport 1,128 soldiers if each bus holds 36 soldiers?"

Almost one-third of the 8th graders answered the question, "31 remainder 12" (Schoenfeld, 1988, p. 84).

Vignette 4

It is late April and the panic is beginning to set in. A quick calculation reveals to the world history teacher that he will not finish the textbook unless he covers an average of 40 pages per day until the end of school. He decides, with some regret, to eliminate a mini-unit on the Caribbean and several time-consuming activities, such as a mock United Nations debate and vote, and discussions of current international events in relation to the world history topics students have studied. To prepare his students for the departmental final exam, the teacher will need to switch into a fast-forward lecture mode.

* * *

Each of these vignettes reveals some aspect of understanding and design. (By the way, the odd-numbered vignettes are true; the others may as well be, given common practice.)

A Familiar Truth

The reflection of the high school English teacher reveals a familiar truth—even good students don't always display a deep understanding of what's been taught even though conventional measures (e.g., course grades and

cumulative GPA) certify success. In her case, testing focused predominantly on the recall of information from textbooks and class presentations. She reported that she rarely was given assessments that called for her to demonstrate deeper understanding.

The fictionalized apples unit presents a familiar scene—an activity-oriented curriculum—in which students participate in a variety of hands-on activities. Such units are often engaging for students. The units may be organized, as in this vignette, around a theme and provide interdisciplinary connections. But questions remain. To which ends is the teaching directed? What are the big ideas and important skills to be developed during the unit? Do the students understand what the learning targets are? How often does the *evidence* of learning from the unit (e.g., the leaf print collage, creative writing stories, and completed word searches) reflect worthwhile content standards? What understandings will emerge from all these activities and will endure?

The mathematics test item reveals another aspect of understanding, or lack of it. While the students computed accurately, they had not grasped the meaning of the question or had apparently not understood how to use what they knew to reach an answer of 32 buses. Could it be that these students had mastered the decontextualized drill problems in the math book and on worksheets but had little opportunity to apply mathematics in real-world applications? Should we conclude that the students who answered, "remainder 12," *really* understand division and its use?

Nearly every teacher can empathize with the world history teacher's struggle, given the pressures to cover textbook material. The challenge is exacerbated by the natural increase of knowledge in fields such as science and history, not to mention additions to the curriculum in recent years (e.g., computer studies and drug education). At its worst, a coverage orientation—marching through the chronology of a textbook irrespective of desired results, student needs and interests, or apt assessment evidence—may defeat its own aims. For what do students remember, much less understand, when surface coverage is valued over uncovering? Such an approach could be labeled "teach, test, and hope for the best."

What the Book Is About

This book is about understanding and its various facets. We think that understanding is not a single concept but a family of interrelated abilities—six different facets—and an education for understanding

develops them all. This book is also about design—the design of curriculums to engage students in exploring and deepening their understanding of important ideas *and* the design of assessments to reveal the extent of their understandings. In this book, we explore a number of related ideas:

- Explore common curriculum, assessment, and instruction practices that may interfere with the cultivation of student understanding.
- Examine a *backward design* process and consider its value in helping to avoid common inadequacies in curriculum and assessment planning.
- Present a theory of the six facets of understanding and explore its theoretical *and* practical implications for curriculum, assessment, and teaching.
- Propose an approach to curriculum and instruction designed to engage students in inquiry, promote "uncoverage," and make the understanding of big ideas more likely.
- Examine a continuum of methods for appropriately assessing the degree of student understanding.
- Consider the role that predictable student misunderstandings should play in the design of curriculums, assessment, and instruction.
- Offer a template to assist in designing curriculums and assessments that focus on student understanding.
- Propose a set of design standards for achieving quality control in curriculum and assessment designs.

This book is intended for educators interested in enhancing student understanding and in designing more effective curriculums and assessments to promote understanding. The audience includes teachers at all levels (elementary through university), subject-matter and assessment specialists, curriculum directors, pre- and in-service trainers, and school-based and central office administrators and supervisors.

Terminology

A few words about terminology are in order. Educators involved in reform work know that the words *curriculum* and *assessment* have almost as many meanings as there are people using the terms. In this book, *curriculum* refers to a specific blueprint for learning that is derived from content and performance standards. Curriculum takes content and shapes it into a plan for effective teaching and learning. Thus, curriculum is more than a general framework, contrary to many state and district documents on curriculum; it is a specific plan with identified lessons in an appropriate form and sequence for directing teaching.

The etymology of the word *curriculum* suggests this meaning: A curriculum is a particular "course to be run," given a desired endpoint. A curriculum is more than a syllabus, therefore: Beyond mapping out the topics and materials, it specifies the activities, assignments, and assessments to be used in achieving its goals. The best curriculums, in other words, are written from the learner's point of view and the desired achievements. They specify what the learner will do, not just what the teacher will do.

By *assessment* we mean the act of determining the extent to which the curricular goals are being and have been achieved. Assessment is an umbrella term we use to mean the deliberate use of many methods to gather evidence to indicate that students are meeting standards. When we speak of evidence of understanding, we are referring to information gathered through a variety of formal and informal assessments during a unit of study or a course. We are not alluding only to end-of-teaching tests or culminating performance tasks. Rather, the collected evidence we seek may well include observations and dialogues, traditional quizzes and tests, and performance tasks and projects, as well as students' self-assessments gathered over time. In fact, a central premise of our argument is that understanding can be developed and evoked only through multiple methods of assessment.¹

By *achievement target* we mean what has often been termed "intended outcomes" or "performance standards." All three terms refer to the desired impact of teaching and learning—what a student should be able to do and what standard should be used to signify understanding. Achievement target properly suggests that we keep aiming for a result using curriculum and instruction. Note that content standards are different from performance standards. Content standards specify the inputs—What is the content that should be covered? Performance standards specify the desired output—What must the student do, and how well, to be deemed successful? Many district and state documents unhelpfully blur this distinction.

The word *understanding* naturally deserves clarification and elaboration, but that work is the challenge for the rest of the book. Understanding turns out to be a complex and confusing target even though we aim for it all the time. In this book, we use "understand" to mean that a student has something more than just textbook knowledge and skill—that a student really "gets it." Understanding, then, involves sophisticated insights and abilities, reflected in varied performances and contexts. We also suggest that different kinds of understandings exist, that knowledge and skill do not automatically lead to understanding, that misunderstanding is a bigger problem than we

realize, and that assessment of understanding therefore requires evidence that cannot be gained from traditional testing alone.

What the Book Is Not About

Understanding by Design is not a prescriptive program. Rather than offering a step-by-step guide, the book provides a conceptual framework, design process and template, and an accompanying set of design standards. We offer no specific curriculum but rather a way to design or redesign any curriculum to make student understanding more likely.

Understanding by Design, therefore, should not be seen as competing with other programs or approaches. In fact, its theory of understanding and the backward design process are compatible with several prominent educational initiatives, including problem-based learning (Stepien & Gallagher, 1997), Socratic seminar, 4-MAT (McCarthy, 1981), Dimensions of Learning (Marzano & Pickering, 1997), *The Skillful Teacher* (Saphier & Gower, 1997), and the recently published book (Wiske, 1997) and workbook (Blythe & Associates, 1998) from the Project Zero team at the Harvard Graduate School of Education on teaching for understanding.

We are restricting our inquiry into understanding in an important way. While teaching for in-depth understanding is a vital aim of schooling, it is only one of many. We are thus not suggesting here that all teaching be geared at all times toward deep and sophisticated understanding. Clearly, there are circumstances when this depth is neither feasible nor desirable. For example, learning the alphabet, acquiring certain technical skills such as keyboarding, and developing the basics in foreign language do not call for in-depth understanding. In some cases, the developmental level of students will determine how much abstract conceptualization is appropriate. Sometimes familiarity as a goal, rather than depth, is quite sufficient for certain topics.

This book is thus built upon a conditional: *If* educators wish to develop greater in-depth understanding in their students, *then* how should they go about it?

One warning, though. All teachers talk about wanting to get beyond coverage to ensure that students really understand what they learn. Although we talk this way, readers may find that what they thought was effective teaching for understanding really wasn't. In fact, we predict that readers will be somewhat disturbed by how hard it is to specify what understanding looks like

and how easily educators can lose sight of understanding even as they try to teach for it.

One further point about our approach. Throughout the book, we offer what we call "misconception alerts" in which we try to anticipate reader misconceptions about the lines of argument and ideas being proposed. This format has a message: Teaching for understanding must successfully predict such misunderstandings if it is to be effective. Indeed, central to the design approach is the need to design lessons and assessments that anticipate, evoke, and overcome the most likely student misconceptions. We put the alerts in boxes for quick accessibility, and the first one is on this page.

Reader, brace thyself! We are asking you to think differently about time-honored habits and points of view about curriculum, assessment, and instruction. As you will see, teaching for understanding requires rethinking what we thought we knew—whether the "we" involves students or educators. But we believe that you will find much food for thought here as well as many practical tips on how to achieve student understanding by design.

Endnote

¹A more comprehensive discussion of assessment can be found in Wiggins (1998).

Misconception Alert

Only alternative methods of teaching and assessing yield understanding. Nothing could be further from the truth. The challenge is to *expand* a teaching repertoire to make sure that a greater diversity of appropriate methods of instruction are used than are found in most classrooms. (See Chapters 6, 7, and 10.)

Our approach is against traditional testing. Not so. Here, too, we seek to expand the normal repertoire to make sure that more appropriate diversity is found in classroom assessment. The challenge is to know which method to use and when, and why. (See Chapters 1 and 5.)

Our approach is against letter grades. Also not true. By and large, letter

grades are here to stay, and nothing in this book is incompatible with grades, transcripts, and college admission requirements. The book should help teachers, especially those at the secondary level, better justify their grading system and provide students with improved feedback about what grades stand for.

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Chapter 1

What Is Backward Design?

To begin with the end in mind means to start with a clear understanding of your destination. It means to know where you're going so that you better understand where you are now so that the steps you take are always in the right direction.

—Stephen R. Covey
The Seven Habits of Highly Effective People

Design—(vb) To have purposes and intentions; to plan and execute

—*Oxford English Dictionary*

Teachers are designers. An essential act of our profession is the design of curriculum and learning experiences to meet specified purposes. We are also designers of assessments to diagnose student needs to guide our teaching and to enable us, our students, and others (parents and administrators) to determine whether our goals have been achieved; that is, did the students learn *and* understand the desired knowledge?

Like other design professions, such as architecture, engineering, or graphic arts, designers in education must be mindful of their audiences. Professionals in these fields are strongly client centered. The

effectiveness of their designs corresponds to whether they have accomplished their goals for the end users. Clearly, students are our primary clients, given that the effectiveness of curriculum, assessment, and instructional designs is ultimately determined by their achievement of desired learnings.

As with other design professions, standards inform and shape our work. The architect, for example, is guided by building codes, customer budget, and aesthetics. The teacher as designer is similarly constrained. We are not free to teach any topic we choose. Rather, we are guided by national, state, district, or institutional standards that specify what students should know and be able to do. These standards provide a framework to help us identify teaching and learning priorities and guide our design of curriculum and assessments. In addition to external standards, we also consider the needs of our students when designing learning experiences. For example, student interests, developmental levels, and previous achievements influence our designs.

Are the Best Curricular Designs "Backward"?

How, then, do these design considerations apply to curriculum planning? We use curriculum as a means to an end. We focus on a particular topic (e.g., racial prejudice), use a particular resource (e.g., *To Kill a Mockingbird*), and choose specific instructional methods (e.g., Socratic seminar to discuss the book and cooperative groups to analyze stereotypical images in films and on television) to cause learning to meet a given standard (e.g., the student will understand the nature of prejudice, and the difference between generalizations and stereotypes).

Why do we describe the most effective curricular designs as "backward"? We do so because many teachers *begin* with textbooks, favored lessons, and time-honored activities rather than deriving those tools from targeted goals or standards. We are advocating the reverse: One starts with the end—the desired results (goals or standards)—and then derives the curriculum from the evidence of learning (performances) called for by the standard and the teaching needed to equip students to perform. This view is hardly radical. Ralph Tyler (1949) described the logic of backward design clearly and succinctly about 50 years ago:

Educational objectives become the criteria by which materials are selected, content is outlined, instructional procedures are developed, and tests and examinations are prepared. . . . The purpose of a statement of objectives is to indicate the kinds of changes in the student to be brought about so

that instructional activities can be planned and developed in a way likely to attain these objectives (pp. 1, 45).

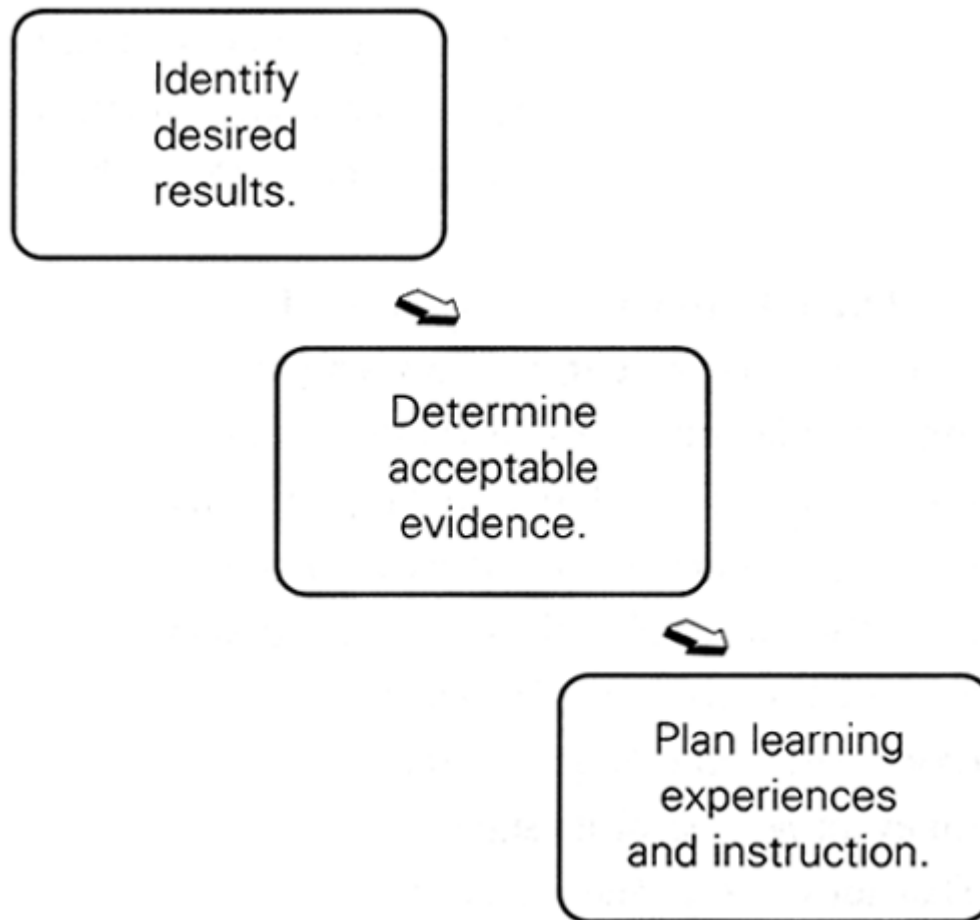
Backward design may be thought of as purposeful task analysis: Given a task to be accomplished, how do we get there? Or one might call it planned coaching: What kinds of lessons and practices are needed to master key performances? The approach to curricular design we are advocating is logically forward and commonsensical but backward in terms of conventional habits, whereby teachers typically think in terms of a series of activities (as in the apples unit presented in the Introduction) or how best to cover a topic (as in the world history vignette).

This backward approach to curricular design also departs from another common practice: thinking about assessment as something we do at the end, once teaching is completed. Rather than creating assessments near the conclusion of a unit of study (or relying on the tests provided by textbook publishers, which may not completely or appropriately assess our standards), backward design calls for us to operationalize our goals or standards in terms of assessment evidence as we *begin* to plan a unit or course. It reminds us to begin with the question, What would we accept as evidence that students have attained the desired understandings and proficiencies—*before* proceeding to plan teaching and learning experiences? Many teachers who have adopted this design approach report that the process of "thinking like an assessor" about evidence of learning not only helps them to clarify their goals but also results in a more sharply defined teaching and learning target, so that students perform better knowing their goal. Greater coherence among desired results, key performances, and teaching and learning experiences leads to better student performance—the purpose of design.

The Backward Design Process

The logic of backward design suggests a planning sequence for curriculum. This sequence has three stages, shown in Figure 1.1. In this section, we examine these stages and illustrate their application with an example of a design for a 5th grade unit on nutrition.

Figure 1.1. Stages in the Backward Design Process

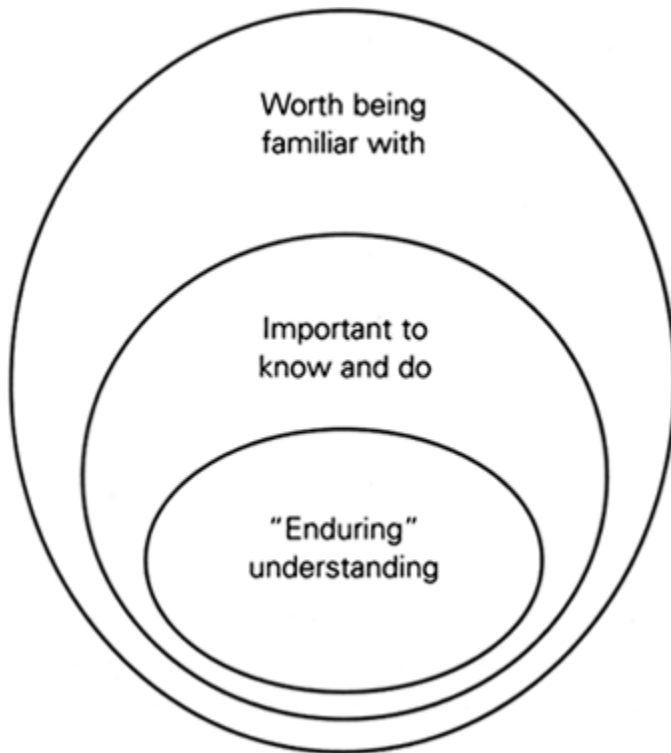


Stage 1. Identify Desired Results

What should students know, understand, and be able to do? What is worthy of understanding? What enduring understandings are desired?

In this first stage, we consider our goals, examine established content standards (national, state, and district), and review curriculum expectations. Given that there typically is more content than can reasonably be addressed, we are obliged to make choices. A useful framework for establishing curricular priorities may be depicted using the three nested rings shown in Figure 1.2 (see p. 10).

Figure 1.2. Establishing Curricular Priorities



The empty background within the middle ring represents the field of possible content (topics, skills, and resources) that might be examined during the unit or course. Clearly, we cannot address all areas; thus, the largest ring identifies knowledge that students should find *worth being familiar with*. During the unit or course, what do we want students to hear, read, view, research, or otherwise encounter? For example, in an introductory course on classroom assessment, it makes sense for adult students to be conversant with the history of standardized testing in the United States and in other nations. Broad-brush knowledge, assessed through traditional quiz or test questions, would be sufficient, given the purpose of the course.

In the middle ring, we sharpen our choices by specifying *important knowledge* (facts, concepts, and principles) and skills (processes, strategies, and methods). We would say that student learning is incomplete if the unit or course concluded without mastery of these essentials. For instance, the characteristics of, and distinctions between, norm- and criterion-referenced assessments would be considered essential knowledge in the assessment course, and some use of that knowledge would properly be expected. Here is another way to think about the middle ring: It specifies the prerequisite knowledge and skills needed by students for them to successfully accomplish key performances.

The smallest ring represents finer-grain choices—selecting the "enduring" understandings that will anchor the unit or course. The term *enduring* refers to the big ideas, the important understandings, that we want students to "get inside of" and retain after they've forgotten many of the details. For the assessment course, students probably should be immersed in the principles of validity and reliability through extensive investigation, design work, and critique of sample tests, if they are to understand valid and reliable assessments.

How does one go about determining what is worth understanding amid a range of content standards and topics? We offer four criteria, or filters, to use in selecting ideas and processes to teach for understanding.

Filter 1. To what extent does the idea, topic, or process represent a "big idea" having enduring value beyond the classroom? Enduring understandings go beyond discrete facts or skills to focus on larger concepts, principles, or processes. As such, they are applicable to new situations within or beyond the subject. For example, we study the enactment of the Magna Carta as a specific historical event because of its significance to a larger idea. That idea is the rule of law, whereby written laws specify the limits of a government's power and the rights of individuals—concepts such as due process. This big idea transcends its roots in 13th century England to become a cornerstone of modern democratic societies.

A big idea also can be described as a *linchpin* idea. The linchpin is the pin that keeps the wheel in place on an axle. Thus, a linchpin idea is one that is essential for understanding. For instance, without grasping the distinction between the letter and the spirit of the law, a student cannot understand the U.S. constitutional and legal system even if that student is highly knowledgeable and articulate about the facts of our history. Without a focus on linchpin ideas that have lasting value, students may be left with easily forgotten fragments of knowledge.

In sum, as Jerome Bruner (1960) put it bluntly in *The Process of Education*, "For any subject taught in primary school, we might ask [is it] worth an adult's knowing, and whether having known it as a child makes a person a better adult" (p. 52). A negative or ambiguous answer means the "material is cluttering up the curriculum."

Filter 2. To what extent does the idea, topic, or process reside at the heart of the discipline? By involving students in "doing" the subject, we provide them with insights into how knowledge is generated, tested, and used.

Consider the ways professionals work within their chosen disciplines—conducting investigations in science, writing for different purposes (to inform, persuade, or entertain) to real audiences, interpreting events and primary source documents in history, applying mathematics to solve real-world problems, researching, critiquing books and movies, and debating issues of social and economic policy. Authentic learning experiences shift a student from the role of a passive knowledge receiver into a more active role as a constructor of meaning.¹

Filter 3. To what extent does the idea, topic, or process require uncoverage?

Think about the abstract ideas in the unit or course, those concepts and principles that are not obvious and may be counterintuitive. For example, in physics, students frequently struggle with ideas concerning gravity, force, and motion. When asked to predict which object—a marble or a bowling ball—will strike the ground first when dropped simultaneously, many students reveal a common misconception by incorrectly selecting the bowling ball.

What important concepts or processes do students often have difficulty grasping? What do they typically struggle with? About which big ideas are they likely to harbor a misconception? These are fruitful topics to select and uncover—by teaching for understanding.

Filter 4. To what extent does the idea, topic, or process offer potential for engaging students? Certain ideas are inherently interesting to students of various ages. And textbook knowledge that initially seems dry or inert can be brought to life by inquiries, simulations, debates, or other kinds of inherently engaging experiences. By having students encounter big ideas in ways that provoke and connect to students' interests (as questions, issues, or problems), we increase the likelihood of student engagement and sustained inquiry. For example, the question, What does it mean to be independent? not only serves as an essential question for the exploration of topics in social studies (Revolutionary War, slavery, and economics) but relates to a fundamental quest of adolescence. Ideas such as these are doorways to other big ideas, such as, What are the responsibilities and constraints that accompany increased freedoms?

None of these ideas for setting priorities and designing for better understanding is radical or new. Indeed, Bruner, in *The Process of Education* (1960), made an elegant case nearly 40 years ago for greater curricular focus on what matters most—powerful ideas with transfer:

The curriculum of a subject should be determined by the most fundamental understanding that can be achieved of the underlying principles that give structure to a subject. . . . Teaching specific topics or skills without making clear their context in the broader fundamental structure of a field of knowledge is uneconomical. . . . An understanding of fundamental principles and ideas appears to be the main road to adequate transfer of training. To understand something as a specific instance of a more general case—which is what understanding a more fundamental structure means—is to have learned not only a specific thing but also a model for understanding other things like it that one may encounter (pp. 6, 25, and 31).

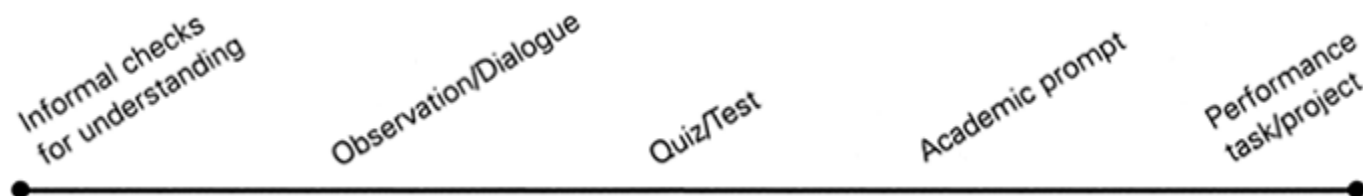
What is perhaps new is what we offer: a process and set of tools (templates and filters) to make the selection of curriculum priorities more likely to happen by design than by good fortune.

Stage 2. Determine Acceptable Evidence

How will we know if students have achieved the desired results and met the standards? What will we accept as evidence of student understanding and proficiency? The backward design approach encourages us to think about a unit or course in terms of the collected assessment evidence needed to document and validate that the desired learning has been achieved, so that the course is not just content to be covered or a series of learning activities.

This backward approach encourages teachers and curriculum planners to first think like an assessor before designing specific units and lessons, and thus to consider up front how they will determine whether students have attained the desired understandings. When planning to collect evidence of understanding, teachers should consider a range of assessment methods, depicted in Figure 1.3.

Figure 1.3. Continuum of Assessment Methods



This continuum of assessment methods includes checks of understanding (such as oral questions, observations, and informal dialogues); traditional quizzes, tests, and open-ended prompts; and performance tasks and projects.

They vary in scope (from simple to complex), time frame (from short-term to long-term), setting (from decontextualized to authentic contexts), and structure (from highly to nonstructured). Because understanding develops as a result of ongoing inquiry and rethinking, the assessment of understanding should be thought of in terms of a collection of evidence over time instead of an event—a single moment-in-time test at the end of instruction—as so often happens in current practice.

Misconception Alert

When we speak of evidence of understanding, we are referring to evidence gathered through a variety of formal and informal assessments during a unit of study or a course. We are not alluding only to end-of-teaching tests or culminating performance tasks. Rather, the collected evidence we seek may well include observations and dialogues, traditional quizzes and tests, performance tasks and projects, as well as students' self assessments gathered over time.

Given its focus on understanding, our unit or course will be anchored by performance tasks or projects—these provide evidence that students are able to use their knowledge in context, a more appropriate means of evoking and assessing enduring understanding. More traditional assessments (such as quizzes, tests, and prompts) are used to round out the picture by assessing essential knowledge and skills that contribute to the culminating performances. Figure 1.4 (see p. 14) shows the balanced use of different types of assessments. We can relate these various assessment types to the nested rings to show the relationship of curriculum priorities and assessments, as Figure 1.5 (see p. 15) illustrates.

Figure 1.4. Types of Assessment

Quiz and Test Items

These are simple, content-focused questions. They

- Assess for factual information, concepts, and discrete skill.

- Use selected-response or short-answer formats.
- Are convergent—typically they have a single, best answer.
- May be easily scored using an answer key (or machine scoring).
- Are typically secure (not known in advance).

Academic Prompts

These are open-ended questions or problems that require the student to think critically, not just recall knowledge, and then to prepare a response, product, or performance. They

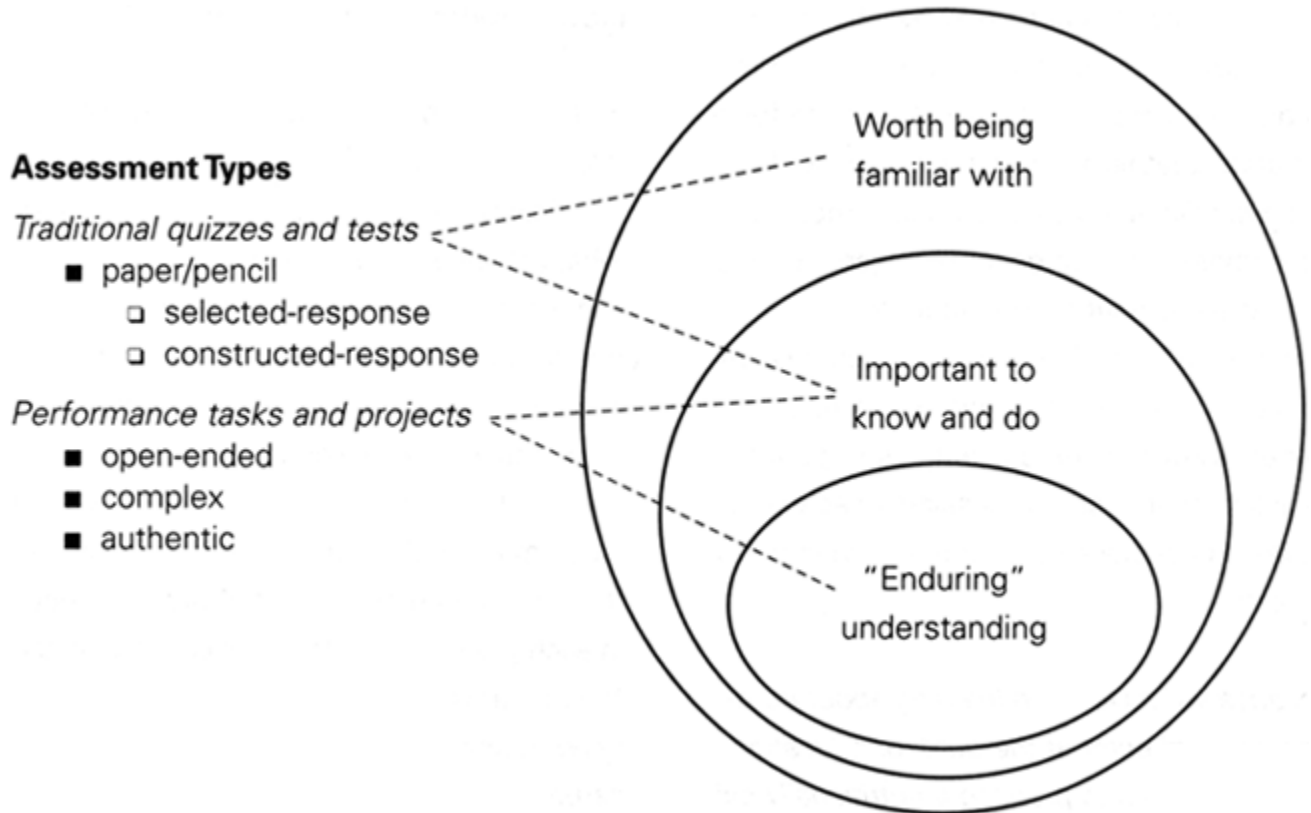
- Require constructed responses under school or exam conditions.
- Are open. There is not a single, best answer or a best strategy for answering or solving them.
- Often are ill-structured, requiring the development of a strategy.
- Involve analysis, synthesis, or evaluation.
- Typically require an explanation or defense of the answer given or methods used.
- Require judgment-based scoring based on criteria and performance standards.
- May or may not be secure.

Performance Tasks and Projects

As complex challenges that mirror the issues and problems faced by adults, they are authentic. Ranging in length from short-term tasks to long-term, multistaged projects, they require a production or performance. They differ from prompts because they

- Feature a setting that is real or simulated: one that involves the kind of constraints, background noise, incentives, and opportunities an adult would find in a similar situation.
- Typically require the student to address an identified audience.
- Are based on a specific purpose that relates to the audience.
- Allow the student greater opportunity to personalize the task.
- Are not secure. Task, criteria, and standards are known in advance and guide the student's work.

Figure 1.5. Curricular Priorities and Assessments



Stage 3. Plan Learning Experiences and Instruction

With clearly identified results (enduring understandings) and appropriate evidence of understanding in mind, educators can now plan instructional activities. Several key questions must be considered at this stage of backward design:

- What enabling knowledge (facts, concepts, and principles) and skills (procedures) will students need to perform effectively and achieve desired results?
- What activities will equip students with the needed knowledge and skills?
- What will need to be taught and coached, and how should it best be taught, in light of performance goals?
- What materials and resources are best suited to accomplish these goals?
- Is the overall design coherent and effective?

Note that the teacher will address the specifics of instructional planning—choices about teaching methods, sequence of lessons, and resource materials—*after* identifying the desired results and assessments. Teaching is a means to an end. Having a clear goal helps us as educators to focus our planning and guide purposeful action toward the intended results.

Application of Backward Design

Setting: We are inside the head of a 5th grade teacher, Bob James, as he designs a three-week unit on nutrition.

Stage 1. Identify Desired Results

In reviewing our state standards in health, I found three content standards on nutrition that are benchmarked to this age level:

- Students will understand essential concepts about nutrition.
- Students will understand elements of a balanced diet.
- Students will understand their own eating patterns and ways in which these patterns may be improved.

Using these standards as the starting point, I need to decide what enduring understanding I want my students to take away from the unit. Although I've never deliberately thought about enduring knowledge, per se, I like the concept and think that it will help me focus my teaching and limited class time on the truly important aspects of this unit. As I think about the three content standards and the four filters for understanding, I think that what I'm really after is

Students will use an understanding of the elements of good nutrition to plan a balanced diet for themselves and others.

This understanding is clearly enduring, because planning nutritious menus is an authentic, lifelong need and way to apply this knowledge. I'm still a little unclear about what "use an understanding" means, though. I'll need to reflect further on how an understanding goes beyond the use of specific knowledge. The basic concepts of nutrition are fairly straightforward, after all, as are the skills of menu planning. Does anything in the unit require, then, any in-depth and deliberate uncoverage? Are there typical misunderstandings, for example, that I ought to more deliberately focus on?

Well, as I think about it, I *have* found that many students harbor the misconception that if food is good for you, it must taste bad. One of my goals in this unit is to dispel this myth so that they won't have an automatic aversion to healthy food. In terms of the potential for engagement, no problem there. Anything having to do with food is a winner with 10- and 11-year-olds. And there are some points to menu planning (such as balancing cost, variety,

taste, and dietary needs) that are not at all obvious. This way of putting my goal will enable me to better focus on these points.

Stage 2. Determine Acceptable Evidence

This will be a bit of a stretch for me. Typically in a three- or four-week unit like this one, I give one or two quizzes; have a project, which I grade; and conclude with a unit test (generally multiple choice or matching). Even though this approach to assessment makes grading and justifying the grades fairly easy, I have come to realize that these assessments don't always reflect the most important understandings of the unit. I think I tend to test what is easy to test instead of assessing what is most important, namely the understandings and attitudes students should take away, above and beyond nutritional facts. In fact, one thing that has always disturbed me is that the kids tend to focus on their grades rather than on their learning. Perhaps the way I've used assessments—more for grading purposes than to document learning—has contributed somewhat to their attitude.

Now I need to think about what would serve as evidence of the enduring understanding I'm after. After reviewing some examples of performance assessments and discussing ideas with my colleagues, I have decided on the following performance task:

Because we have been learning about nutrition, the camp director at the outdoor education center has asked us to propose a nutritionally balanced menu for our three-day trip to the center later this year. Using the food pyramid guidelines and the nutrition facts on food labels, design a plan for three days, including the three meals and three snacks (a.m., p.m., and campfire). Your goal: a tasty and nutritionally balanced menu.

I'm excited about this task because it asks students to demonstrate what I really want them to take away from the unit. This task also links well with one of our unit projects: to analyze a hypothetical family's diet for a week and propose ways to improve their nutrition. With this task and project in mind, I can now use quizzes to check their prerequisite knowledge of the food groups and food pyramid recommendations, and a test for their understanding of how a nutritionally deficient diet contributes to health problems. This is the most complete assessment package I've ever designed for a unit, and I think that the task will motivate students as well as provide evidence of their understanding.

Stage 3. Plan Learning Experiences and Instruction

This is my favorite part of planning—deciding what activities the students will do during the unit and what resources and materials we'll need for those activities. But according to what I'm learning about backward design, I'll need to think first about what essential knowledge and skills my students will need to demonstrate the important understandings I'm after. Well, they'll need to know about the different food groups and the types of foods found in each group so that they will understand the USDA food pyramid recommendations. They will also need to know about human nutritional needs for carbohydrates, protein, sugar, fat, salt, vitamins, and minerals, and about the various foods that provide them. They'll have to learn about the minimum daily requirements for these nutritional elements and about various health problems that arise from poor nutrition. In terms of skills, they will have to learn how to read and interpret the nutrition fact labels on foods and how to scale a recipe up or down since these skills are necessary for their culminating project—planning healthy menus for camp.

Now for the learning experiences. I'll use resources that I've collected during the past several years—a pamphlet from the USDA on the food groups and the food pyramid recommendations; a wonderful video, "Nutrition for You"; and, of course, our health textbook (which I now plan to use selectively). As I have for the past three years, I will invite the nutritionist from the local hospital to talk about diet, health, and how to plan healthy menus. I've noticed that the kids really pay attention to a real-life user of information they're learning.

My teaching methods will follow my basic pattern—a blend of direct instruction, inductive (constructivist) methods, cooperative learning group work, and individual activities.

Planning backward has been helpful. I now can more clearly specify what knowledge and skills are really essential, given my goals for the unit. I'll be able to concentrate on the most important topics (and relieve some guilt that I am not covering everything). It is also interesting to realize that even though some sections of the textbook chapters on nutrition will be especially useful (for instance, the descriptions of health problems arising from poor nutrition), other sections are not as informative as other resources I'll now use (the brochure and video). In terms of assessment, I now know more clearly what I need to assess using traditional quizzes and tests, and why the performance task and project are needed—to have students demonstrate their understanding. I'm getting the feel for backward design.

Notice that the approach to design described in the nutrition unit has four essential features:

1. The assessments—the performance tasks and related sources of evidence—are designed *prior* to the lessons. These assessments serve as teaching targets for sharpening the focus of instruction, because we know in specific terms what we want students to understand and be able to do. These assessments also guide our decision making about what content needs to be emphasized versus content that is not essential.
2. Most likely, the familiar and favorite activities and projects will have to be modified in light of the evidence needed for assessing targeted standards. For instance, if the apple unit described in the Introduction were planned using this backward design process, we would expect some of the activities to be revised, to better support the desired enduring understandings.
3. The teaching methods and resource materials are chosen last, mindful of the work that students must produce to meet the standards. For example, rather than focusing on cooperative learning because it's the "in" teaching strategy, the question from a backward design perspective becomes, What instructional strategies will be most effective at helping us reach our targets? Cooperative learning may or may not be the best approach for a group of students and these particular standards.
4. The role of the textbook may shift from the primary resource to a supporting one. Indeed, in the nutrition unit illustration, the 5th grade teacher realized the strengths and limitations of the text. Given other valuable resources (the nutritionist, the brochure, and the video), he didn't feel compelled to cover the book word for word.

We have presented a preliminary sketch of the big-picture design approach. Figure 1.6 shows how the three stages of design might look in practice. Begin with a key design question; ponder how to narrow down the possibilities by setting intelligent priorities ("Design Considerations"); self-assess; self-adjust; and finally critique each element of design against appropriate criteria ("Filters"); and end up with a product that meets appropriate design standards in light of the achievement target ("What the Final Design Accomplishes").

Figure 1.6. The Big Picture of a Design Approach

Key Design Question	Design Considerations	Filters (Design Criteria)	What the Final Design Accomplishes
Stage 1. What is worthy and requiring of understanding?	<p>National standards.</p> <p>State standards.</p> <p>District standards.</p> <p>Regional topic opportunities.</p> <p>Teacher expertise and interest.</p>	<p>Enduring ideas.</p> <p>Opportunities for authentic, discipline-based work.</p> <p>Uncoverage.</p> <p>Engaging.</p>	Unit framed around enduring understandings and essential questions.
Stage 2. What is evidence of understanding?	<p>Six facets of understanding.</p> <p>Continuum of assessment types.</p>	<p>Valid.</p> <p>Reliable.</p> <p>Sufficient.</p> <p>Authentic work.</p> <p>Feasible.</p> <p>Student friendly.</p>	Unit anchored in credible and educationally vital evidence of the desired understandings.
Stage 3. What learning experiences and teaching promote understanding, interest, and excellence?	<p>Research-based repertoire of learning and teaching strategies.</p> <p>Essential and enabling knowledge and skill.</p>	<p>WHERE</p> <p>Where is it going?</p> <p>Hook the students.</p> <p>Explore and equip.</p> <p>Rethink and revise.</p> <p>Exhibit and evaluate.</p>	Coherent learning experiences and teaching that will evoke and develop the desired understandings, promote interest, and make excellent performance more likely.

Take Stage 1, which concerns the targeted understanding. The designer must first clarify what is most worthy of understanding—in need of uncovering within a unit. Considering appropriate local, state, and national standards documents helps frame the target and prioritize instruction. The designer continues to refer to the design criteria to narrow and sharpen the focus of the unit, using the filters. The final product is a unit framed in terms of essential questions, which points clearly and explicitly toward a big idea. Refer to teacher Bob James's thinking about his nutrition unit in Stage 1 to see a hypothetical example.

In future chapters, we uncover this design process, examining its implications for the development and use of assessments, the planning and organization of curriculum, and the selection of powerful methods of teaching. In the closing chapters, we present a complete design template corresponding to each of the cells of Figure 1.6, a tool for designers that incorporates the elements of backward design. Finally, we visit the issue of quality control and offer a set of design standards by which assessments, curriculums, and teaching for understanding may be gauged—and improved.

Our first task, though, as the first cell in the figure suggests, is to better understand what content is worthy and needful of understanding. (Recall that teacher Bob James questioned how knowledge and skill differ from understanding.) Our first task for the next three chapters, then, is to better understand *understanding*.

Endnote

1. For greater insight into authenticity in learning and achievement, see Newmann & Associates (1997) and Wiggins (1998).

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What Is a Matter of Understanding?

This chapter focuses on the first phase of curricular design: identifying our goals and determining what is worthy of understanding. Any complex unit of study will involve many targets simultaneously: knowledge, skills, attitudes, habits of mind, and understanding. We clarify how the goal of understanding differs from other achievement targets, when teaching for understanding is needed, and how to select the important understandings to focus upon. We also examine the power of essential questions for framing the curriculum and focusing instruction on matters of understanding.

What Should Be Uncovered?

Consider simple examples of our need to understand: We may read a text where we know all the words but cannot derive a meaning. We are puzzled by an unexpected comment from a friend. We have data that we cannot explain. We need to reach a decision regarding a perplexing issue. We must solve a problem with no pat solution.

The need to understand is heightened when an idea, fact, argument, or experience goes against our expectations or is counterintuitive. For instance, 12th grade students learn that a body's acceleration can decrease but its speed can still be increasing. How can *that* be? Sixth graders multiply fractions using an algorithm. Although they have the formula, they have no clear idea why two numbers, when multiplied, yield a smaller result.

A curriculum designed to develop understanding would uncover complex, abstract, and counter-intuitive ideas by involving students in active questioning, practice trying out ideas, and rethinking what they thought they knew. "Uncoverage" describes the design philosophy of guided inquiry into abstract ideas, to make those ideas more accessible, connected, meaningful, and useful. Uncoverage, then, must be done by design.

The Expert-Novice Gap

But our work as designers is complicated by the gap between expert and novice. What we as adults understand and appreciate seems of self-evident value and interest. But to the student the same idea can seem opaque, abstract—without meaning or value. A challenge we face as designers is to know the design *users* well enough—the students—to know what will need uncoverage from *their* point

of view, not ours. In textbook writing, for example, important ideas are often reduced to summary sentences.

Thus, in addition to knowing our end users well, as educators, we must also know the subject well enough to get beyond inert textbook and curriculum framework language—to bring to life the important issues and people. Our designs must help the student see what is worth understanding, what needs further exploration and understanding from the activities and readings.

To begin our inquiry, let's uncover the weaknesses in these conventional curriculum designs by revisiting two vignettes from the Introduction. In the second vignette, the apples unit seems to focus in depth on a particular theme (harvest time), through a specific and familiar object (apples). But as the depiction reveals, there is no real depth because there is no enduring learning for the students to derive. The work is hands on without being "minds on," because students do not need to extract sophisticated ideas. They don't have to work at understanding; they need only experience.

Moreover, there are no clear priorities—the activities appear to be of equal value. The students' role is merely to participate in mostly enjoyable activities, without having to demonstrate that they understand any big ideas at the core of the subject (excuse the pun). All *activity-based*—as opposed to standards-based—teaching shares the weakness of the apples unit: Little in the design asks students to derive intellectual fruit from the unit. One might view this activity-oriented approach as "faith in learning by osmosis."

In the fourth vignette, the world history teacher covers vast amounts of content during the last quarter of the year. However, in his harried march to get through a textbook, the teacher apparently does not consider what the students will understand and apply from the material. Even if the course has some clear goals, how will students determine what is most important—by the number of paragraphs the textbook devotes to a topic? What kind of intellectual scaffolding is provided to guide students through the important ideas? In coverage-oriented instruction, the teacher, in effect, merely checks off topics that were covered and moves on, whether or not students understand or are confused. This approach might be termed "teaching by mentioning it."

Similar Results

Although the errors in design differ, in both units, the result is the same—student understanding of important ideas is not likely. Both the

teacher of the apples unit and the history teacher would claim, if asked, that they want students to understand. "I want them to understand the importance of farming, harvesting, the role of the seasons," says the elementary school teacher. "I want students to understand the causes and effects of the two World Wars," says the high school history teacher. Yet, their curricular plans would show that understandings are more likely to occur through chance student interest and reflection than through the design of inquiry and performance. In neither case are all students guided to analyze their experience to derive understandings that the teachers claim the units are about.

Looking beyond these particular examples, let us summarize four common design flaws that work against understanding:

- The design does not prioritize important ideas worthy of understanding. To the students, various activities and textbook topics appear of equal importance.
- The design does not foster students' understanding because it does not encourage them to explore essential questions, link key ideas, or rethink their initial ideas or theories.
- Students have no clear performance targets. They do not know the purpose of activities and lessons or the expected performance requirements, other than to participate in the activities and pay attention during lectures.
- The necessary evidence that understanding has occurred has not been established. Without explicit performance goals or culminating assessments of understanding, teachers do not know which students understand what, and to what level of sophistication.

How, then, do we ensure that understanding is the true goal? We do so by knowing when to focus on understanding and when not to, and by knowing what subject matter needs uncoverage to be understood and learned.

Focusing on Priorities

Not everything we ask students to learn must be thoroughly understood. The purpose of a course or unit of study, the age of the learners, and the time available all determine how much or how little teachers can expect students to understand. But if we as educators seek greater depth and breadth, how do we set priorities amid so many content standards and despite little time? When is it worth the trouble to get students to understand? When is it sufficient for students to have only familiarity? Or acquaintance? In terms of curriculum design, how does understanding, as a target, differ from knowledge and skill?

If readers find the above questions difficult to answer, it might be because of three other complex questions:

- What knowledge is *worth* understanding—worth spending time to uncover?
- What kind of achievement target is understanding, and how does it differ from other targets or standards?
- What are matters of understanding in *any* achievement target? How does an educator identify or select the understanding element embedded or contained in *any* complex achievement target, such as state or district content standards?

Let us probe each of these questions.

What Knowledge Is Worth Understanding?

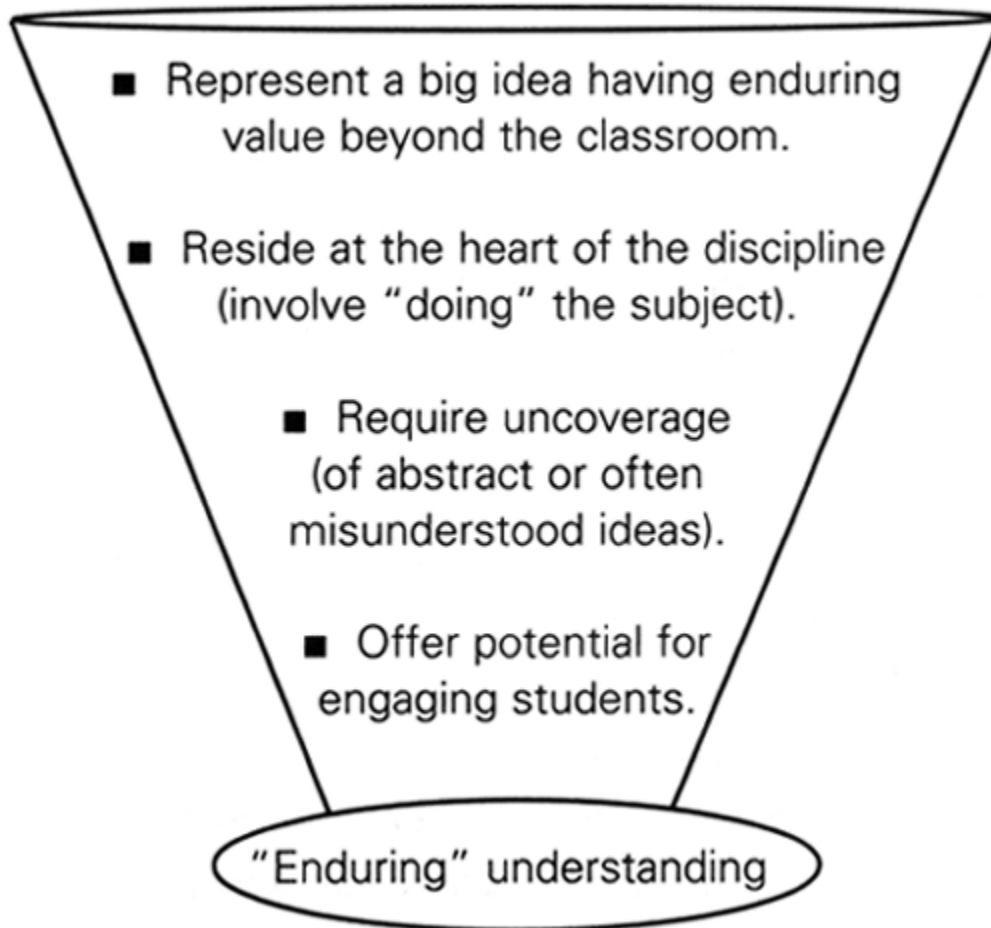
When should teachers require students to have an in-depth and broad understanding of something, and when should they be satisfied if students have only a superficial familiarity with it? How deep an understanding should teachers strive for in the available time? In other words, how can teachers identify the knowledge worth uncovering? Only by clarifying their priorities can teachers construct the most effective and efficient curriculum.

Earlier in this book, we stated four criteria for determining when material is worthy not just of covering but of understanding. The material should be

- Enduring.
- At the heart of the discipline.
- Needing uncoverage.
- Potentially engaging.

By coupling these criteria with the rings graphic introduced in Chapter 1 (Figure 1.2), we now offer a process for clarifying priorities and focusing on enduring understanding. While there are many fruitful topics worthy of understanding, the reality of teaching is that we cannot go into depth on everything. Figure 2.1 shows filters for arriving at enduring understanding. We need to make wise choices and stick with our priorities, based on the time available and any established curricular framework of content standards.

Figure 2.1. Filters for Selecting Understandings



From a practical design point of view, a major challenge facing any designer is the inadequacy of most district, state, and national standards in helping clarify which are the big ideas and how best to uncover them. Many such statements are either too vague—"The student will be proficient in all genres of writing"—or they unhelpfully suggest that didactic teaching and rote learning will be sufficient for learning—"The student will know that there are three branches of government and why." Even when the standards identify a desired understanding, there is often too little guidance on what kinds of evidence are valid or adequate—"The student will understand that acceleration is a change in motion due to one or more forces acting on the body."

To more effectively craft and edit unit designs, we find that distinguishing three degrees of specificity and clarity in such standards is helpful. *Topical statements* are the least specific. They merely define the subject-area topic to be addressed without specifying what is to be understood and how—"Students will understand the Civil War." *General*

understandings are a bit more specific. They identify what needs to be understood in an overall sense, but provide little help into the specific insights to be gained or the methods and assessments best used to gain and display such understanding—"Students will understand the causes and effects of the Civil War." *Specific understandings* not only summarize the particular understandings sought, they also suggest the kinds of work needed to achieve and show such an understanding—"Students will demonstrate through historical and social analysis and role-plays their understanding of the Civil War as a struggle of state versus federal power over economic and cultural affairs that continues to the present day."¹ Teacher-designers will likely need to amplify or sharpen the framing of the content standards into useful matters of understanding if they work in states or districts that provide less specific guidance.

Another way to frame a design issue at stake is to refer to our prioritization/assessment graphic (see Figure 1.5). Teacher-designers need to ask themselves the extent to which the standard merely requires students to be "familiar with" the textbook explanation of the Civil War—in which case a quiz on the textbook account will be sufficient—or the extent to which the standard requires the student to achieve a more complex and "enduring understanding" through analysis, synthesis, and evaluation of given accounts culminating in their own performance.

What Kind of Achievement Target Is Understanding, and How Does It Differ from Other Targets or Standards?

To understand a topic or subject is to use knowledge and skill in sophisticated, flexible ways. Knowledge and skill, then, are necessary elements of understanding, but they are not synonymous with understanding. Matters of understanding require more: Students need to make conscious sense and apt use of the knowledge they are learning and the principles underlying it.

By contrast, when we say we want students to know the key events of medieval history, to be effective touch typists, or to be competent speakers of French, the focus is on a set of facts, skills, and procedures that need only be internalized, as opposed to pondered and understood in terms of underlying principles or philosophy.

Understanding involves the abstract and conceptual, not merely the concrete and discrete: concepts, generalizations, theories, and mental links between facts. And understanding also involves the ability to use knowledge and skill

in context, as opposed to doing something routine and on cue in out-of-context assignments or assessment items. So when we say we want students to understand the knowledge and skill they have learned, we are not being redundant. We want them to be able to use that knowledge in authentic situations as well as to understand the background of that knowledge. That background involves the theory or principles that give it importance, along with the reasons that justify our calling it knowledge as opposed to authoritative belief.

Because such matters of understanding are abstract and subtle, they are prone to student misunderstanding. In other words, students may know without understanding. For example, almost all students know how to multiply large numbers, but few know why the procedure works. All students know that the earth revolves around the sun, but few understand the evidence that was decisive in proving such a counterintuitive fact. Thus, a matter of understanding involves inquiring both into what makes knowledge knowledge and how to turn discrete skills into a purposeful repertoire.

What Are Matters of Understanding in Any Achievement Target?

Even fact-based objectives and straightforward skill development may contain latent matters of understanding. What conceptual or theoretical elements might lie within any objective? How can teachers identify those elements that require a more reflective understanding?

Consider, for example, persuasive writing as a desired achievement. At first blush, it would appear that we are dealing exclusively with a set of straightforward skills to be mastered. But on further reflection, we note a conceptual element here, something to intellectually uncover and better understand apart from the writing skill: The student must come to an understanding of *persuasion* and how it works if her writing is to be persuasive. The student must come to understand which techniques of persuasion work and why, and also must learn the subtleties in the role that audience, topic, and medium play in effective persuasion. In short, to learn to write persuasively, the student has to understand the *purpose* of the genre and the criteria by which we judge effectiveness of persuasion.

Also, understanding may well be developed by means other than writing. For example, to better understand persuasion, one might be asked to read famous speeches, critique TV commercials, and read and discuss such literature as Orwell's essay on language and politics. Thus, the skill goal of persuasive writing contains within it a conceptual matter of understanding.

Similarly, when working with factual knowledge or textbook summaries of big ideas, it often appears (especially to students) that there is nothing complicated about dates in history, vocabulary in language arts, or axioms in geometry. Here, too, it seems as if the only understanding that is required is attention, the need to grasp the meaning of the words in English and commit the facts to memory.

But underneath many straightforward facts is often a complicated and arguable matter of understanding, with a history worth knowing: What part of the fact might be embedded theory? For example, the "facts" of evolution are intertwined with a complex and arguable theory. Or, in vocabulary: Who determines legitimate and illegitimate meanings of words, and why do word meanings change, sometimes dramatically? For example, *objective* and *subjective* have reversed meaning from prior centuries. Or, in terms of axioms: What justifies an axiom? Why do we have the ones we have, and what makes them neither arbitrary nor true but important (e.g., the parallel postulate and its complex history)?

Problems for Understanding

In all three examples (facts, definitions, and axioms), problems for understanding lurk beneath *seemingly* unproblematic knowledge. In a curriculum for understanding, rethinking the apparently simple but actually complex is central to the nature of understanding and to a necessarily iterative approach to curricular design. Students continually must be led to recognize the *need* for uncoverage of knowledge and skill they learn—the need for rethinking. For their part, teachers must be wary of the students' tendency to think of their own role as apprehension of textbook content as opposed to active inquiry into its justification, meaning, and value.

To put this in fancy philosophical language, the student brings a naive epistemology to the work, namely, that there is neat and clean knowledge out there and it is my job to learn (i.e., memorize) and use it as directed. A key challenge in teaching for understanding is to make the student's view of knowledge and coming-to-know more sophisticated by revealing the problems, controversies, and assumptions that lie behind much given and seemingly unproblematic knowledge. The work that teachers design should demonstrate to students that there is always a need to make sense of content knowledge through inquiries and applications—to get beyond dutiful assimilation to active reflection, testing, and meaning making.

To review, four criteria serve as filters to select ideas to teach for understanding. The idea, topic, or process

- Represents a big idea with enduring value beyond the classroom.
- Resides at the heart of the discipline, the "doing" of the subject in context.
- Requires uncoverage.
- Offers potential for engaging students.:

What specific curricular elements might meet these criteria? Here are some examples:

- *Principles, laws, theories, or concepts* that are likely to have meaning for students if they appear to be sensible and plausible (not out of the blue or arbitrary pronouncements). In some sense, the student can verify, induce, or justify these ideas through inquiry and construction.
- *Counterintuitive, nuanced, subtle, or otherwise easily misunderstood ideas*, such as gravity, evolution, imaginary numbers, irony, texts, formulas, theories, and concepts.
- *The conceptual or strategic element of any skill* (e.g., persuasion in writing or "creating space" in soccer): the clarification of means and ends, and insight into strategy, leading to greater purposefulness and less mindless use of techniques. Such mindfulness can only come about by active reflection upon and analysis of performance (i.e., what works, what doesn't, and why).

Questions: Doorways to Understanding

Let me suggest one answer [to the problem of going into depth and avoiding excessive coverage] that grew from what we have done. It is the use of the organizing conjecture. They serve two functions, one of them obvious: putting perspective back into the particulars. The second is less obvious and more surprising. The questions often seemed to serve as criteria for determining where [students] were getting and how well they were understanding.

—Bruner, 1973a, pp. 449–450

After we have identified an objective as requiring uncoverage, how do we more deliberately and practically design units and courses to develop student understanding? How might we take a mass of content knowledge and shape it to engage and focus student inquiry? One key design strategy is to build curriculum around the questions that gave rise to the content knowledge in

the first place, rather than simply teaching students the "expert" answers found in textbooks.

Let's revisit the apples vignette (see Introduction) and consider possible key questions to use in framing the unit:

- How have planting, growing, and harvest seasons affected life in the United States over the years? How have children's roles at harvest time changed? Do we still need to close schools for nearly three months in the summer?
- How do geography and climate affect the growth of crops? Why is apple growing well suited to our region? What other regions support apple growing?
- Who was the real Johnny Appleseed, and were there others? Will an "apple a day keep the doctor away"? Compared to other foods, how good for you are apples? Can today's apple farmers survive economically?

Notice how organizing the unit around questions such as these would provide teacher and students with a sharper focus and better direction for inquiry. The questions implicitly demand more than just a smorgasbord of activities found in the original unit. They call for students to make meaning of more carefully selected activities, and they call for teachers to devise assessment tasks related to answering them.

Regardless of which questions the teacher or class chooses, such questions render the unit design more coherent and make the student's role more appropriately intellectual. Without asking and pursuing such overarching questions, the student is confronted with a set of disconnected activities, resulting in minimal understanding of important ideas. Without such questions to focus instruction, teaching easily falls into superficial and purposeless coverage. The world history unit in the opening vignettes (see Introduction) could be similarly improved by key questions that prioritize the textbook content for teachers and students.

At the heart of all uncoverage, then, is the deliberate interrogation of the content to be learned, as opposed to just the teaching and learning of the material. While this focus may sound odd, it points to an important truth about coming to understand: Knowledge must be more than mentioned or referred to in indiscriminate ways. Important ideas must be questioned and verified if they are to be understood. One might say that content that hasn't been questioned is like courtroom claims that are never examined, leading to a hodgepodge of opinions and beliefs instead of to knowledge.

Practically speaking, we must turn content standards and outcome statements into question form, and then design assignments and assessments that evoke possible answers. In contrast, most current curricular frameworks and standards documents make the mistake of framing core content as fact-like sentences rather than revealing them to be *culminating* summary insights, derived from questions and inquiries.² We should not be surprised, then, if we continue to see apple and world history units of the kind described in the Introduction. Only by framing our teaching around valued questions and worthy performances can we overcome activity-based and coverage-oriented instruction, and the resulting rote learning that produces formulaic answers and surface-level knowledge.

As Bruner's opening quote suggests, the best curriculum-guiding questions have another virtue—they serve as criteria against which to judge progress in learning. For example, from the work to date, are we getting clearer about the apple's influence on our region's economy and culture? Do we yet have sufficient insight into the economics of farming? Student responses enable us to test our activity and assignment designs to ensure that learning is more than only engaging activity or indiscriminate coverage. Are we making headway in answering the questions? If not, students *and* teacher need to adjust.

Essential and Unit Questions

What types of questions might guide our teaching and engage students in uncovering the important ideas at the heart of each subject? We might begin to identify such questions by using the format found in the quiz show *Jeopardy*. Given the content found in a textbook—the answers to be learned—what is an important question for which the textbook provides an answer? For instance, if "balance of powers" (a core idea) is the answer, then what are some questions that give rise to it? Were there *other* answers that once seemed plausible but turned out to be less useful or correct? For the balance of power example, such a question might be: What structure of government best suits the fact that "all men are not angels" (to quote the *Federalist Papers*)?

Not just any question will do. Consider the following questions and notice how they differ from those typically posed during daily lessons and in textbooks:

- Is there enough to go around (e.g., food, clothes, water)?
- Is history a history of progress?
- Does art reflect culture or shape it?

- Are mathematical ideas inventions or discoveries?
- Must a story have a beginning, middle, and end?
- When is a law unjust?
- Is gravity a fact or a theory?
- What do we fear?
- Who owns what and why?
- Is biology destiny?

These types of questions cannot be answered satisfactorily in a sentence—and that's the point. To get at matters of deep and enduring understanding, we need to use provocative and multilayered questions that reveal the richness and complexities of a subject. We refer to such questions as "essential" because they point to the key inquiries and the core ideas of a discipline. Figure 2.2 offers some tips for using essential questions.

Figure 2.2. Tips for Using Essential Questions

- Organize programs, courses, units of study, and lessons around the questions. Make the *content* the answers to the questions.
- Select or design assessment tasks, up front, that are explicitly linked to the questions. The tasks and performance standards should clarify what acceptable pursuit of, and answers to, the questions actually look like.
- Use a reasonable number of questions per unit (between two and five). Make less be more. Prioritize content for students to make the work clearly focus on a *few* key questions.
- Edit the questions to make them as engaging and provocative as possible for the particular age group. Frame the questions in "kid language" as appropriate.
- Through a survey or informal check, ensure that every child understands the questions and sees their value.
- Derive and design specific concrete exploratory activities and inquiries for each question.
- Sequence the questions so they lead naturally from one to another.
- Post the overarching questions in the classroom, and encourage students to organize notebooks around them to emphasize their importance for study and note taking.
- Help students personalize the questions. Encourage them to share examples, personal stories, and hunches, and to bring clippings and artifacts to class to help the questions come alive.
- Allot sufficient time for "unpacking" the questions—examining subquestions and probing implications. Be mindful of student age, experience, and other instructional obligations. Use question-concept maps to show relatedness of questions.
- Share your questions with other faculty to make planning and teaching for cross-subject matter coherence far more likely. To promote essential questions schoolwide, ask teachers to

post their essential questions in the faculty room or in department meeting and planning areas. Circulate questions in the faculty bulletin and present and discuss them at faculty meetings.

Bruner (1996) suggests that questions of this type "are ones that pose dilemmas, subvert obvious or canonical 'truths' or force incongruities upon our attention" (p. 127). He provides an apt example of an essential question in biology, a recurring question that can be used to organize a unit, course, or entire program:

One of the principal organizing concepts in biology is the question, "What function does this thing serve?"—a question premised on the assumption that everything one finds in an organism serves some function or it probably would not have survived. Other general ideas are related to this question. The student who makes progress in biology learns to ask the question more and more subtly, to relate more and more things to it (Bruner, 1960, p. 28).

Essential questions can and should be asked over and over. Practically speaking, they can recur across the curriculum (horizontally) and over the years (vertically). Central Park East Secondary School in New York, the school founded by Deborah Meier, builds its entire curriculum around a set of such essential questions linked to key "habits of mind":

In every class and every subject, students will learn to ask and to answer these questions:

- a. From whose viewpoint are we seeing or reading or hearing? From what angle or perspective?
- b. How do we know when we know? What's the evidence, and how reliable is it?
- c. How are things, events, or people connected to each other? What is the cause and what is the effect? How do they fit together?
- d. What's new and what's old? Have we run across this idea before?
- e. So what? Why does it matter? What does it all mean? (Courtesy of Central Park East Secondary School.)

Essential questions may be characterized by what they do:

- *Go to the heart of a discipline.* Essential questions can be found in the most historically important and controversial problems and topics in various fields of study: Is a "good read" a great book? Was arithmetic an invention or a discovery? Is history always biased? Do men

- naturally differ from women?
- *Recur naturally throughout one's learning and in the history of a field.* The same important questions are asked and re-asked as an outgrowth of the work. Our answers may become increasingly sophisticated, and our framing of the question may reflect a new nuance, but we return again and again to such questions.
 - *Raise other important questions.* They invariably open up a subject, its complexities, and its puzzles; they suggest fruitful research rather than lead to premature closure or unambiguous answers. For example, What do we mean by "naturally" differ?

Essential questions have proven to be an effective way of framing a course or an entire program of study. Indeed, some school districts have grounded their curriculum in essential questions.³

Experience has shown that an essential question may not always serve as a fruitful doorway into a specific topic, despite the question's overarching and provocative nature. The question may simply prove to be too global, abstract, or inaccessible for students (e.g., Is biology destiny?). Thus, more specific questions are often needed to introduce and guide the work of a particular unit of study.

We find it helpful to distinguish between two types of curriculum-framing questions: *essential* questions and *unit* questions. Unit questions are more subject- and topic-specific, and therefore better suited for framing particular content and inquiry, leading to the often more subtle essential questions. The differences in specificity are illustrated by the examples in Figure 2.3. Unit questions such as those in the figure

- *Provide subject- and topic-specific doorways to essential questions.* Unit questions frame a specific set of lessons; they are designed to point to and uncover essential questions through the lens of particular topics and subjects. For example, Is science fiction great literature? is a unit question that guides inquiry in a specific literature course. Are "good reads" great books? is an essential question that the entire English/Language Arts faculty in a district or school would address.
- *Have no one obvious "right" answer.* Answers to unit questions are not self-evidently true. Unit questions open up and suggest important multiple lines of research and discussion; they uncover rather than cover up the subject's controversies, puzzles, and perspectives. They serve as discussion starters and problem posers, rather than lead toward "the" answer the teacher wants.
- *Are deliberately framed to provoke and sustain student interest.* Unit questions work best when they are designed to be thought provoking to students. Such questions often involve the counterintuitive, the thought provoking, and the controversial as a means of engaging students in sustained inquiries. They should be sufficiently open to accommodate diverse interests and

learning styles and allow for unique responses and creative approaches—even ones that the teacher had not considered.⁴

Figure 2.3. Sample Essential and Unit Questions

Essential Question	Unit Question
Must a story have a moral, heroes, and villains?	What is the moral of the story of the Holocaust? Is Huck Finn a hero?
How does an organism's structure enable it to survive in its environment?	How do the structures of amphibians and reptiles support their survival?
Who is a friend?	Are Frog and Toad true friends? Has it been true in recent U.S. history and foreign affairs that "the enemy of my enemy is my friend"?
What is light?	How do cats see in the dark? Is light a particle or a wave?
Do we always mean what we say and say what we mean?	What are sarcasm, irony, and satire? How do these genres allow us to communicate <i>without</i> saying what we mean?
Is U.S. history a history of progress?	Is the gap between rich and poor any better now than it was 100 years ago? Do new technologies always lead to progress?

It is important to note that the distinctions between essential and unit questions are not categorically pure, not black and white. Instead, they should be viewed as residing along a continuum of specificity as shades of gray. The point is not to quibble about whether a given question is an

essential or a unit question, but rather to focus on its larger purposes—to frame the learning, engage the learner, link to more specific or more general questions, and guide the exploration and uncovering of important ideas.

Questions do more than serve as doorways to understanding. They can effectively establish priorities in a course of study. The following *set* of such questions, posed by two history scholars (Burns & Morris, 1986), is a way of coming to understand the U.S. Constitution. Think of an entire course in civics, government, or U.S. history designed around these questions:

- *Is there too much—or too little—national power?* Are the limits placed on the federal government's powers by the U.S. Constitution realistic and enforceable?
- *Does federalism work?* Is the Constitution maintaining an efficient and realistic balance between national and state power?
- *Is the judicial branch too powerful?* Are the courts exercising their powers appropriately as interpreters of the Constitution and shapers of public policy?
- *Can liberty and security be balanced?* How can a republican government provide for the national security without endangering civil liberties?
- *What do we mean by "All men are created equal"?* What kinds of equality are and should be protected by the Constitution and by what means?
- Are the rights of women and minorities adequately safeguarded?
- Does the president possess adequate—or too much—power over war making and foreign policy?
- *Does the U.S. Government have too many constitutional checks and balances?* Does the separation of powers among the three branches of government create a deadlock in governance?

Such questions are not just posed once orally by teachers. They are posted on blackboards, as the headings of student pages in notebooks, and on unit handouts. They frame and structure the lessons and give rise to appropriate research, note taking, and final performance.

In the absence of explicit overarching questions, students are left with rhetorical questions in a march through coverage or activities. Students then come to realize that their *real* job is to take in sanctioned views, as purveyed in authoritative teacher and textbook pronouncements. Such official opinions, especially when combined with many leading teacher questions, will eventually stifle thoughtful inquiry, as the philosopher Gadamer (1994) suggests:

It is opinion that suppresses questions. Opinion has a curious tendency to propagate itself . . . to question means to lay open to place in the open.

As against the fixity of opinions, questioning makes the object and its possibilities fluid. A person skilled in the "art" of questioning is a person who can prevent questions from being suppressed by the dominant opinion. . . . Only a person who has questions can have [understanding] (pp. 364–367).

A Cycle of Questions-Answers-Questions

Our *designs*, not just our teaching style, must ensure that students see learning as anchored in questions and requiring cycles of questions-answers-questions. The key to understanding by design is to cause rethinking through appropriate inquiry and performance. That work requires a very different curricular design than the typical scope and sequence of a march through answers, with those expert answers unmoored from the questions that gave rise to them in the first place.

When merely learning answers is the goal, too often the instruction ironically precludes students from pursuing the questions that *naturally* arise in the unfolding work—leading to less understanding as well as less engagement. That result is because a unit is too often tacitly conceived as a set of unproblematic facts and theories to be learned without interrogation.

Simple examples from mathematics can illustrate the need. It would be silly to argue that students only need to learn the theorems in geometry in the form of statements to be memorized without their also learning about the proofs that justify the theorems—learning how to come up with and recreate such proofs. There is no other way to understand except through asking: Why is it true a triangle always has 180 degrees? How can we say that for sure? We would think it odd or unacceptable for a geometry teacher to argue that there is no time to inquire into theorem statements because there are so many proofs to cover. Yet, this approach is now unfortunately what many teachers end up doing when they march through books and lessons as if hearing and reading facts were sufficient to understand those facts.

Questions not only focus learning, they also make all subject-knowledge possible. If students are to understand what is known, they need to simulate or recreate some of the inquiry by which the knowledge was created. Such an approach is, after all, how the pioneer came to understand the unknown: asking questions and testing ideas.⁵ Think of curriculum as not just the teaching of what we know but the designing of student inquiries into what justifies calling the content that is covered genuine knowledge; into how the knowledge came to be understood (i.e., the history of what is known and the different

interpretations that have occurred and are possible); and into the value or importance of the knowledge (found through applying it). As later chapters show, such explorations and performances are central to our attempts to make sense of anything we don't understand and to demonstrate that we understand it.

Misconception Alert

To say that "coursework derives from questions" might be misunderstood, however, because all teachers ask questions. We mean here the development and unfolding of content out of *itself*, not teacher probing of student answers or the asking of leading questions. Anchoring work in questions in this sense is very different from teachers' using questions to check for factual knowledge, move toward the right answer, or sharpen students' responses. Too often, students leave school never realizing that knowledge is answers to someone's prior questions, produced and refined in response to puzzles, inquiry, testing, argument, and revision. To teach from questions means rhetorically asking, If knowledge is made up of answers, then what were the questions that gave rise to textbook or teacher answers and current subject-matter knowledge answers?

Entry-Point Questions for Understanding

Essential and unit questions, though thought provoking, are typically difficult and sometimes esoteric. The questions may not initially connect with the experiences or interest of students. Or students may have a hard time seeing the relationship of an overarching question to the facts and skills they are expected to learn. How, then, do we introduce students to big-idea questions? How do we make essential or unit questions an accessible and useful foundation upon which inquiry and performance can be built? We do so by starting units with provocative and specific entry-point questions that point to the larger questions.

Students of all ages—children and adults—need concrete and meaningful experiences, problems, applications, and shifts of perspective to enable an important question to *arise*. An abstract discussion of property rights is made quickly accessible and intriguing by asking students if the saying, "Finders keepers, losers weepers," is a sound moral principle, and by

building role-play around the idea. Then, when the discussion and exercise are de-briefed, the larger questions about property naturally arise. The student must come to understand each unit and its specific questions and activities as raising larger questions. *If we do our preliminary entry-point question and activity design well, the student is more likely to spontaneously ask important questions and more quickly see their importance. Such insight is a key indicator of the success of our design for understanding.*

In science, suppose the unit centers on the basic astronomy idea discussed earlier. Starting with the question, Why is the heliocentric view more justified than the geocentric view in explaining phenomena? is unlikely to capture the interest of most students. On the other hand, merely stating the truth—i.e., providing an answer to a question the student has not asked or been helped to ask—bypasses inquiry and deep understanding. We might begin instead with a dare: Can you provide a plausible argument that the earth is stationary? Or, we might begin instead with the question, Why is it warmer in summer and colder in winter? and ask students to come up with provisional answers. We might then encourage them to interview a few other people—students and adults—to ask their opinion. Larger questions naturally arise out of the debate or surveys once the correct answer is known: Why is the right answer so poorly understood? Why is the truth so counterintuitive? How was it figured out? At some point in the unit, other inquiry or essential questions may arise: Is science "common sense" or not? What did Ptolemy explain clearly, but it took thousands of years before the current theory was developed? How did Copernicus, Kepler, and Newton come up with the modern answer?

We do not mean to imply that students are never ready, willing, and able to handle important questions. On the contrary, sometimes a simple introductory talk, problem, or case study can make them ready for a headlong assault on a question occupying the greatest minds. For that matter, students sometimes ask such questions entirely on their own, and the teachable moment has arrived. Our caution is that teachers and curriculum designers should map out a likely progression of simple to complex questions to provide a framework for the unfolding of student inquiry. Often the essential or unit question cannot be immediately accessible or useful without background knowledge and investigation.

Though we discuss the practical structuring of such work in later chapters, the general point here is that plunking down a big-idea question at the

beginning of a unit may not always succeed in stimulating interest and inquiry. The student typically does not know enough or care enough about the issues involved to see the need or value in addressing such a question. Rather, simple introductory questions are needed that frame the design of lessons or a unit as lead-ins to the overarching unit and essential questions.

One straightforward first approach for making essential or unit guiding questions more accessible is through selective editing. This method was used by a teacher in New York State for a Russian history unit within a global studies course. He modified the original essential question, Was Gorbachev a hero or a traitor to his country? with a simple edit to create an entry-point question linked to provocative role-play. The students were involved in a meeting-of-the-minds format involving Gorbachev, Yeltsin, Lenin, Stalin, Marx, Trotsky, and Catherine the Great. The debate question was, Who Blew It? The work culminated in a mock newspaper article and editorial, and an essay on the key unit question.

Thus, guidelines for entry-point questions involve four criteria. The questions should be framed for maximal simplicity; be worded in student-friendly language; provoke discussion and questions; and point toward the larger essential and unit questions. Heidi Hayes Jacobs cites an example of an entry-point question to use with young children: What is snow?⁶ The question quickly challenges the boundaries of the concept that press the matter deeper: Is snow ice? Is ice water? Is man-made snow the same as natural snow? Here are some other examples of possible entry-point questions:

- Start with the expression, "You know who your real friends are," then ask, Do you? (Can be used to study works such as *A Separate Peace*, *To Kill a Mockingbird*, and *Pigman*, with the same question asked in different ways.)
- Does food that is good for you have to taste bad? (Used as a stimulus to some lessons in the nutrition unit discussed throughout this book.)
- In what ways is a fairy-tale "true"? In what ways is any documentary "false"? (Can be used to compare myths, novels, biographies, histories, and docudramas.)
- Was George Washington any different from Palestinian terrorists trying to protect their country?
- Is a straight line always the shortest possible distance? (Can be used to study spherical and other non-Euclidean geometries.)
- Was Jefferson a hypocrite? Did he really think of a slave as a sub-human while writing the Declaration of Independence?
- What makes people act phony? (Can be used to introduce *Catcher in the Rye*.)
- Is slang untranslatable? (Can be used to introduce colloquialisms and the problems of

- translating into a foreign language.)
- Is honesty the best policy or just the right thing to do? (Can be used to study noble characters in literature and history.)

The kinds of entry-point questions we are discussing often emerge from student responses to lessons or inquiries, followed by guided reflection on their work. Here are examples of student questions:

- Wait, yesterday you said it's colder in winter because of the sun's angle, but how does that explain cold days in summer? And why aren't the coldest days of the year in December?
- How can that be? How could we have called ourselves a democracy but not have allowed people to directly elect their own senators for over a century?
- But if Oedipus was really so clever, why would he be so blind to...?

Indeed, if you are not getting at least occasional student questions such as these, it is likely that not enough opportunity for digging into ideas is being provided; that is, instruction is too didactic or textbook driven.

A Return to the Nutrition Unit

Setting: Bob James, our teacher from Chapter 1 who was designing a unit on nutrition, reflects on the role of essential and unit questions.

This idea of essential and unit questions has really gotten me thinking. I'm especially intrigued by this notion: If the textbook contains the answers, then what are the questions? As I reflect on my own education, I can't recall ever being in a course in which the content was framed around important, thought-provoking questions. Some of my teachers and professors asked thought-provoking questions during class, but I see these essential questions as different. I see how they provide a focus for all the work and knowledge mastery, if done right. I now feel a bit cheated since I'm beginning to realize the power of these overarching questions for pointing to the bigger ideas within a subject or topic.

Ever since I began teaching, I have tried to get my students to stretch their thinking by asking questions such as: Can you give another example of ____? How does ____ relate to ____? What might happen if ____? Do you agree with ____, and why or why not? While I'm pretty good at posing these day-to-day questions, I realize that for the nutrition unit, I'll have to give more thought to up-front questions.

Well, I suppose a basic question for the unit should be, What is healthy eating? That gets at the essence of what I want my students to take away—the enduring understanding. It also links naturally to larger essential questions that could be used to frame the entire health curriculum: What is healthy living? What is wellness? But will that grab my kids? A more provocative entry question might be, Can food that is good for you also taste good? That might work because kids at this age are fond of junk food, and many seem to believe that if food is nutritional, it has to taste "yucky."

To see if I was on the right track, I brought up my ideas over lunch with a few of the teachers in the faculty room, and they really got into it! We had a very interesting discussion about my question that led to other questions: If left on their own, will children eat what they need nutritionally? Do tastes change as we grow up—in the direction of healthier eating? If so, why? What about others in the animal kingdom, then? Do young animals naturally eat what is good for them? What is the role of junk food advertising on the eating patterns of children and adults? We were really "cooking" when the lunch period ended and I had to leave for recess duty. I think I'll stew on this awhile.

(Later) I've decided to keep my initial question, What is healthy eating? for the overall unit, but I'll use an entry question, Can food that is good for you also taste good? to get the students involved from the start. Because I try to give my kids some say in what they'll be learning, I'll also ask them for any questions that interest them about eating and health. A 3rd grade teacher suggested posting these overarching questions on a bulletin board. I really like this idea because the posted questions will provide a visible reminder of the focus of our work during the unit.

Now that I'm adding essential and unit questions to my teaching repertoire, I can be even more effective in framing my units of study around important ideas. In addition, these questions will provide a clearer focus for my kids and a sharper target for my own teaching.

Endnotes

1. Some of the clearer state and district documents take a slightly different formatting approach. They first state the standard, then use bulleted indicators to show the kinds of lessons, activities, and performances that are appropriate for learning and assessing such standards.

2. See Chapter 1 of Erickson (1998) for a thorough discussion of the limits of various national standards documents and the need to be clearer about the questions and understandings sought.

3. For example, Lake Washington School District in Redmond, Washington, and Pomperaug Regional School District 15 in Middlebury, Connecticut, use discipline-based essential questions to guide their development of courses, units, and accompanying performance assessment tasks. For further information, see Erickson (1998) and *Educators in Connecticut's Pomperaug Regional School District 15* (1996).

4. A variant of these questions and criteria was first proposed in Wiggins (1987a). In the Harvard *Teaching for Understanding* project (Wiske, 1997) and Blythe & Associates (1998), when used as overarching course and program standards, such questions are presented under the heading of "throughlines." See pp. 69 ff. in Wiske, 1997.

5. This is not a blanket call for a discovery-based or recapitulationist approach to instruction. Rather, we note here that understanding a big idea typically requires the kind of active inquiry, discussion, and applications we describe. See Chapter 8 for a more comprehensive discussion of the problem.

6. For other ideas on how to make effective use of such questions, readers should consult Jacobs's new book on curriculum mapping (1997, pp. 26–33). It has a short but insightful chapter on essential questions as a way of curricular mapping, with other fine examples and ideas for their use.