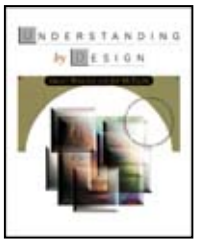
Understanding by Design

by Grant Wiggins and Jay McTighe



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.

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.

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.

Figure 1.1. Stages in the Backward Design Process

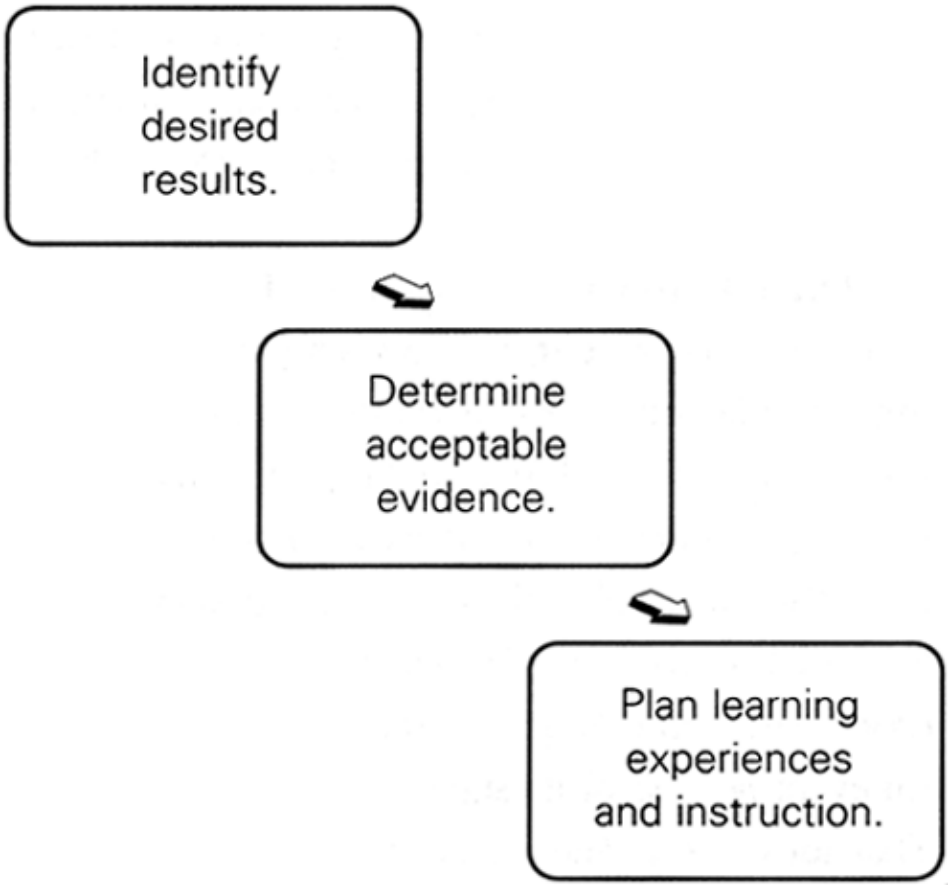
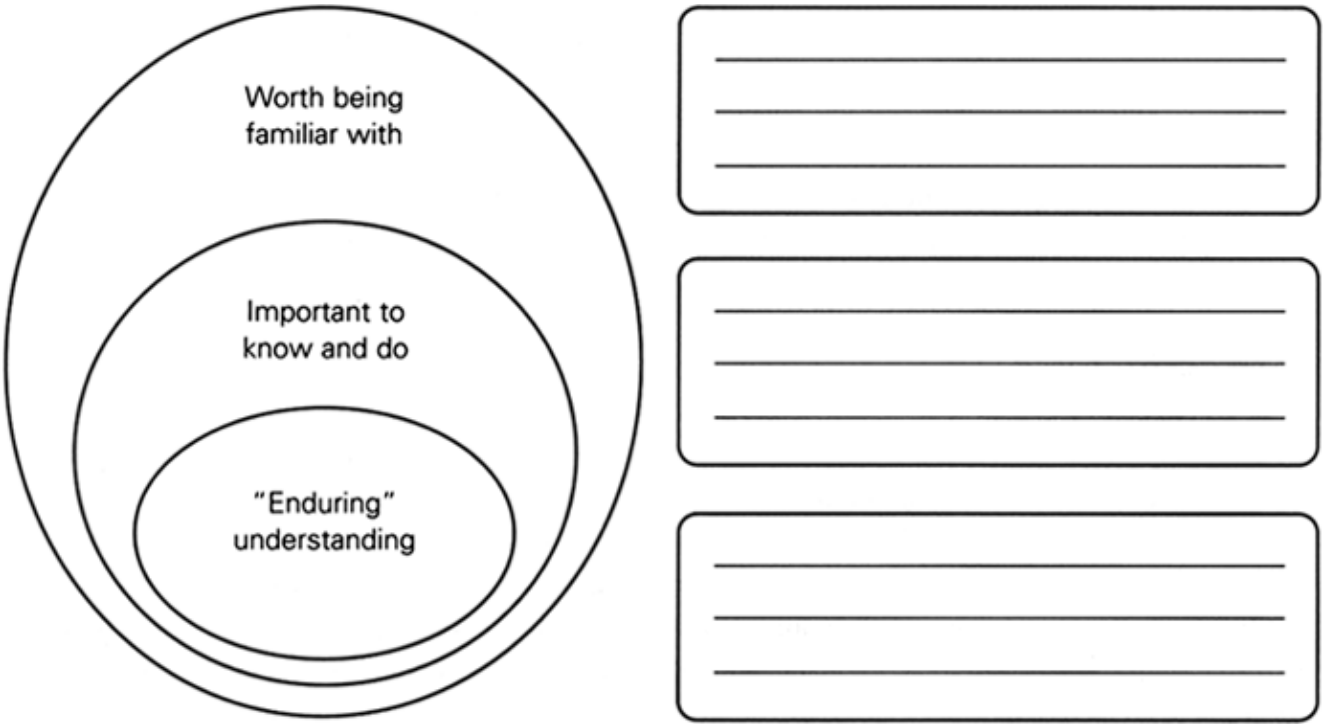


Figure 1.2. Establishing Curricular Priorities



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).

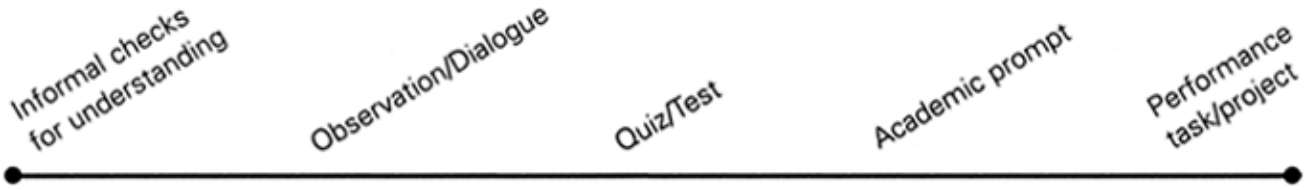
What is perhaps new is what we offer: a process and set of tools (templates and filters) to make the selection of curriculum priorities more likely to happen by design than by good fortune.

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

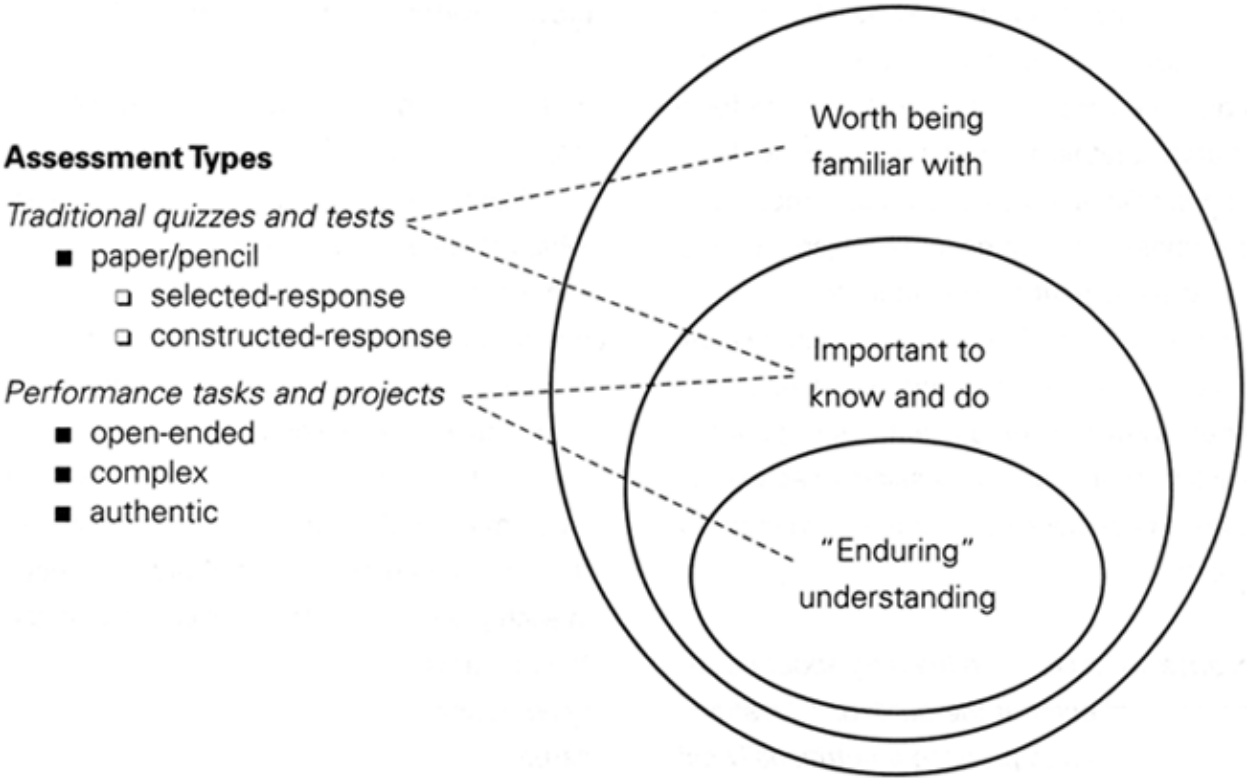
- Require constructed responses under school or exam conditions.
- Are open. There is not a single, best answer or a best strategy for answering or solving them.
- Often are ill-structured, requiring the development of a strategy.
- Involve analysis, synthesis, or evaluation.
- Typically require an explanation 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?	National standards. State standards. District standards. Regional topic opportunities. Teacher expertise and interest.	Enduring ideas. Opportunities for authentic, discipline-based work. Uncoverage. Engaging.	Unit framed around enduring understandings and essential questions.
Stage 2. What is evidence of understanding?	Six facets of understanding. Continuum of assessment types.	Valid. Reliable. Sufficient. Authentic work. Feasible. Student friendly.	Unit anchored in credible and educationally vital evidence of the desired understandings.
Stage 3. What learning experiences and teaching promote understanding, interest, and excellence?	Research-based repertoire of learning and teaching strategies. Essential and enabling knowledge and skill.	WHERE Where is it going? Hook the students. Explore and equip. Rethink and revise. Exhibit and evaluate.	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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