time restrictions and content overload. However, they can focus on a smaller set of big ideas and core tasks in the discipline by framing work around essential questions and appropriate performance assessment. The more specific facts, concepts, and skills identified by the content standards (and often assessed on standardized tests) can then be taught in the context of exploring these larger ideas and abilities.

Because big ideas are inherently transferable, they help connect discrete topics and skills. For example, the essential question, "How do effective writers hook and hold their readers?" provides an umbrella for learning a host of important skills and knowledge called for in English or language arts standards (e.g., different author's styles, literary genre, various literary techniques). Similarly in mathematics, the big idea that "All forms of measurement contain errors" can be used to guide learning the basics of measuring with a ruler, as well as more sophisticated concepts in statistics.

> **MISCONCEPTION ALERT!**
>
> In this book, we use the term standards to refer collectively to formally specified learning goals in the subject areas. In some places the *standards* refer only to content, but in others they refer also to "performance indicators" or the equivalent (the New York science example, cited earlier, makes the distinction clearly). Whether they refer only to the "inputs"—content—or to the desired "outputs"—evidence—for our purposes here they are all lumped under the term *standards*. If local designers are trying to map standards into the UbD Template, however, it may be necessary to place so-called indicators, benchmarks, and performance goals in Stage 2 because they speak more to evidence of the standard being met than of the standard per se. In fact, many state and national documents are unclear on this important distinction, so care must be taken in the analysis at the local level.

The second justification for unpacking content standards in this way comes from research on learning from cognitive psychology. Consider the following summaries of findings from the book *How People Learn* (Bransford, Brown, & Cocking, 2000):

> *A key finding in the learning and transfer literature is that organizing information into a conceptual framework allows for greater transfer. (p. 17)*
>
> *Learning with understanding is more likely to promote transfer than simply memorizing information from a text or a lecture. (p. 236)* [A more detailed discussion of relevant research findings is presented in Chapter 13.]
>
> *Experts first seek to develop an understanding of problems, and this often involves thinking in terms of core concepts or big ideas. Novices' knowledge is much less likely to be organized around big ideas; novices are more likely to approach problems by searching for correct formulas and pat answers that fit their everyday intuitions. (p. 49)*

What exactly is a *big* idea and a *core* task?

Suppose, then, that we use the backward design process to plan a unit of study. Can we be sure that the unit will cause student understanding? Not necessarily. To be elegant and powerful, the design has to be coherent and focused on clear and worthy intellectual priorities—on what we call "big ideas" and "core tasks." Let us take each of these in turn.

Given that every topic typically encompasses more content than we can reasonably address, we are obliged to make deliberate choices *and set explicit priorities.* Having chosen what to teach (and what not to), we have to help the learners see the priorities within what we ask them to learn. Our designs should clearly signal these priorities so that all learners will be able to answer these questions: What is most important here? How do the pieces connect? What should I pay most attention to? What are the (few) bottom-line priorities?

The big ideas connect the dots for the learner by establishing learning priorities. As a teacher friend of ours observed, they serve as "conceptual Velcro"—they help the facts and skills stick together and stick in our minds! The challenge then is to identify a *few* big ideas and carefully design around them, resisting the temptation to teach everything of possible value for each topic. As Bruner (1960) put it years ago,

> *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. A negative or ambiguous answer means the material is cluttering up the curriculum. (p. 52)*

A big idea may be thought of as a *linchpin.* The linchpin is the device that keeps the wheel in place on an axle. Thus, a linchpin is one that is essential for understanding. Without grasping the idea and using it to "hold together" related content knowledge, we are left with bits and pieces of inert facts that cannot take us anywhere.

For instance, without grasping the distinction between the letter and the spirit of the law, a student cannot be said to understand the U.S. constitutional and legal system—even if that student is highly knowledgeable and articulate about many facts of constitutional history. Without a focus on the big ideas that have lasting value, students are too easily left with forgettable fragments of knowledge. Thus, a student may have memorized all the Amendments to the Constitution and may be able to rattle off the names of key Supreme Court decisions; but if the student is unable to explain how it is possible for laws to change while legal and democratic principles remain the same, then we would judge the understanding as inadequate.

For another example, consider "the five biggest ideas in science," as described in a book by that name (Wynn & Wiggins, 1997). The authors suggest a series of questions that embody five fundamental ideas in science:

> *Question: Do basic building blocks of matter exist? And if so what do they look like?*
> *Answer: Big Idea #1—Physics' Model of the Atom*
>
> *Question: What relationships, if any, exist among different kinds of atoms, the basic building blocks of the universe?*
> *Answer: Big Idea #2—Chemistry's Periodic Law*

Question: Where did the atoms of the universe come from, and what is their destiny?
Answer: Big Idea #3—Astronomy's Big Bang Theory

Question: How is the matter of the universe arranged in planet earth?
Answer: Big Idea #4—Geology's Plate Tectonics Model

Question: How did life on earth originate and develop?
Answer: Big idea #5—Biology's Theory of Evolution (pp. v–vi)

What makes them the big ideas? According to Wynn & Wiggins (1997), big ideas are "chosen especially for their power to explain phenomena, they provide a comprehensive survey of science" (p. v). Whether you agree with their particular choices, the authors' approach reflects the need to focus on a smaller set of priority ideas and use them to frame teaching and assessment.

Big ideas at the "core" (versus the "basics")

From one perspective, the phrase "big idea" is just right, since we want to signal that some ideas serve as umbrella concepts. But from another point of view, the term "big" can be misleading. A big idea is not necessarily vast in the sense of a vague phrase covering lots of content. Nor is a big idea a "basic" idea. Rather, big ideas are at the "core" of the subject; they need to be uncovered; we have to dig deep until we get to the core. Basic ideas, by contrast, are just what the term implies—the basis for further work; for example, definitions, building-block skills, and rules of thumb. Ideas at the core of the subject, however, are ideas that are the hard-won results of inquiry, ways of thinking and perceiving that are the province of the expert. They are *not* obvious. In fact, most expert big ideas are abstract and *counterintuitive* to the novice, prone to misunderstanding.

Consider some ideas at the core of various fields, contrasted with "basic terms," to see this point more clearly:

Basic Terms	*Core Ideas*
• Ecosystem	• Natural selection
• Graph	• "Best fit" curve of the data
• Four basic operations	• Associativity and transitivity (cannot divide by zero)
• Story	• Meaning as projected onto the story
• Composition of a picture	• Negative space
• Offense and defense	• Spreading the defense, thus opening up space for the offense
• Experiment	• Inherent error and fallibility of experimental methods and results
• Fact versus opinion	• Credible thesis

The big ideas at the core of a subject are arrived at, sometimes surprisingly slowly, via teacher-led inquiries and reflective work by students. (Later in the book we will suggest that "understandings" and "essential questions" should always point beyond the basic knowledge and skill to the core of a subject.)

One of us once watched a group of special education students work to uncover big ideas at the core of *Macbeth*—honor and loyalty. The two teachers shifted deftly between the play (read aloud in chunks to ensure literacy issues didn't get in the way of understanding) and questioning the students' experience with issues of honor. Among the questions they asked were these: What is the difference between things that happen to us and things that we make happen? What is honor? Is there a cost or price for honor? Is it worth it? What is loyalty? Is there tension between loyalty and honor in *Macbeth*? In our own lives?

Students were asked to find answers from the play and their own lives for each question. "Why is defending your honor so hard?" one of the teachers asked, causing a thin, tall fellow to sit bolt upright, show a kind of focus in his eyes that had been absent until then, and answer poignantly about the loss of friends when he stood on principle in defense of another friend. What happened in *Macbeth* suddenly seemed more important but also complex—human. The student had made the transfer, and had an insight: The core of the idea of loyalty involves inescapable dilemmas, because loyalties invariably collide. Learning that does not penetrate to the core of what is vital about an idea yields abstract, alien, and uninteresting lessons. When we say we want students to understand the knowledge they are learning, we are not being redundant or naïve about its value, given the time and obligations we have.

A big idea at the core of mathematics is "unitizing"—the ability of a numeral to represent different numbers. Place value is not understandable unless learners grasp this: "Unitizing requires that children use numbers to count not only objects but also groups—and to count them both simultaneously. The whole is thus seen as a group of a number. . . . For learners, unitizing is a shift of perspective" (Fosnot & Dolk, 2001b, p. 11).

A big idea is therefore both central to coherent connections in a field of study *and* a conceptual anchor for making facts more understandable and useful. Once again we invoke an old notion. Bruner (1960) famously described such conceptions as "structure":

> *Grasping the structure of a subject is understanding it in a way that permits many other things to be related to it meaningfully. To learn structure, in short, is to learn how things are related. . . . To take an example from mathematics, algebra is a way of arranging knowns and unknowns in equations so that the unknowns are made knowable. The three fundamentals involved . . . are commutation, distribution, and association. Once a student grasps the ideas embodied by these three fundamentals, he is in a position to recognize wherein "new" equations to be solved are not new at all. (pp. 7–8)*

Not long after, Phillip Phenix wrote in *Realms of Meaning* (1964) of the importance of designing around "representative ideas," because they enable learning that is both effective and efficient:

> *Representative ideas are clearly of great importance in economizing learning effort. If there are certain characteristic concepts of a discipline that represent it, then a thorough understanding of these ideas is equivalent to a knowledge of the entire discipline. If knowledge within a discipline is organized according to certain patterns, then a full comprehension of those patterns goes far toward making intelligible the host of particular elements that fit into the design of the subject. (p. 323)*

And, he noted, such "big ideas" have an unusual characteristic: They generate new knowledge in the field while also being helpful to novice learners.

Consider a course on educational assessment, in which one big idea is "credible evidence." The more technical and specific concepts (such as validity and reliability) and the more technical skills (such as computing standard deviations) are properly subsumed under this idea, with its transferability to other areas where we might find similar questions (e.g., "How credible are the results? How confident are we in our findings?"). A related big idea is that *all* educational assessment should be like civil law: We need a "preponderance of evidence" in order to "convict" a student of meeting stated goals. Why a preponderance? Because each measure has inherent error (another big idea) and any single test result is inadequate to "convict." Without being able to intelligently discuss error *in general* in this way, students in an assessment course cannot be said to understand "reliability" and its importance even if they can accurately define the term or compute it using coefficients.

Our colleague Lynn Erickson (2001) offers a useful working definition of "big ideas." They are

- Broad and abstract
- Represented by one or two words
- Universal in application
- Timeless—carry through the ages
- Represented by different examples that share common attributes (p. 35)

More generally, then, as we see it, a big idea can be thought of as

- Providing a focusing conceptual "lens" for any study
- Providing breadth of meaning by connecting and organizing many facts, skills, and experiences; serving as the linchpin of understanding
- Pointing to ideas at the heart of expert understanding of the subject
- Requiring "uncoverage" because its meaning or value is rarely obvious to the learner, is counterintuitive or prone to misunderstanding
- Having great transfer value; applying to many other inquiries and issues over time—"horizontally" (across subjects) and "vertically" (through the years in later courses) in the curriculum and out of school

Our last criterion, transfer, turns out to be vital, as suggested by what Bloom (1981) and his colleagues said about the nature and value of big ideas:

> *In each subject field there are some basic ideas which summarize much of what scholars have learned. . . . These ideas give meaning to much that has*

been learned, and they provide the basic ideas for dealing with many new problems. . . . We believe that it is a primary obligation of the scholars [and] teachers to search constantly for these abstractions, to find ways of helping students learn them, and especially to help students learn how to use them in a great variety of problem situations. . . . To learn to use such principles is to possess a powerful way of dealing with the world. (p. 235)

In other words, a big idea, is not "big" merely by virtue of its intellectual scope. It has to have pedagogical power: It must enable the learner to make sense of what has come before; and, most notably, be helpful in making new, unfamiliar ideas seem more familiar. Thus, a big idea is not just another fact or a vague abstraction but a conceptual tool for sharpening thinking, connecting discrepant pieces of knowledge, and equipping learners for transferable applications.

In pedagogical practice, a big idea is typically manifest as a helpful

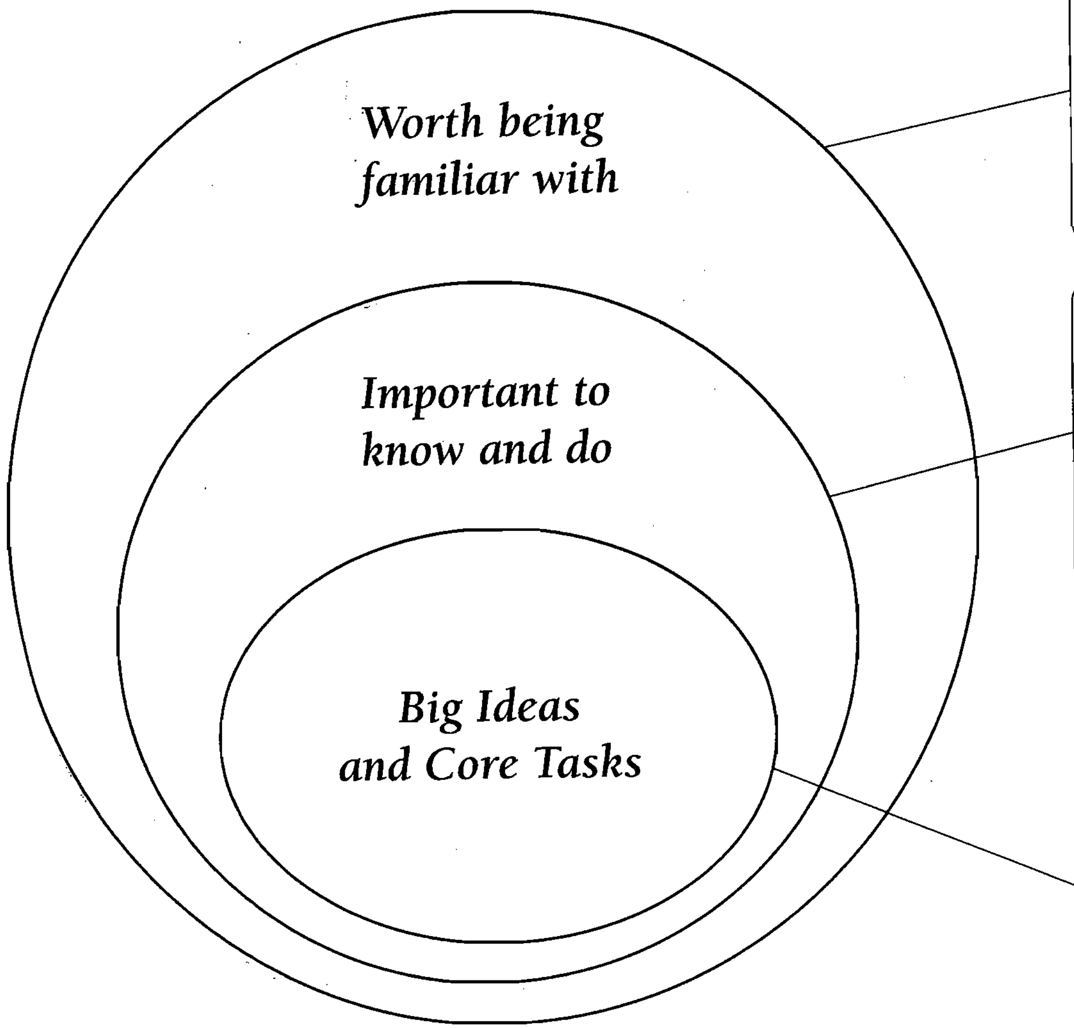
- Concept (e.g., adaptation, function, quantum, perspective)
- Theme (e.g., "good triumphs over evil," "coming of age," "go West")
- Ongoing debate and point of view (e.g., nature versus nurture, conservatives versus liberals, acceptable margin of error)
- Paradox (e.g., freedom must have limits, leave home to find oneself, imaginary numbers)
- Theory (e.g., evolution via natural selection, Manifest Destiny, fractals for explaining apparent randomness)
- Underlying assumption (e.g., texts have meaning, markets are rational, parsimony of explanation in science)
- Recurring question (e.g., "Is that fair?" "How do we know?" "Can we prove it?")
- Understanding or principle (e.g., form follows function, the reader has to question the text to understand it, correlation does not ensure causality)

Note, then, that a big idea can manifest itself in various formats—as a word, a phrase, a sentence, or a question. Put the other way around, a core concept, an essential question, and a formal theory are all about big ideas, expressed in different ways. However, as we explore in later chapters, the way we frame the big ideas is important and not merely a matter of taste or style. Framing the big ideas in terms of what we want the learner to come to understand about them turns out to be critical to good design work.

A prioritizing framework

Because we typically face more content than we can reasonably address, and because it is often presented as if everything were equally important for students, we are obliged to make choices and frame priorities. A useful framework for establishing priorities around big ideas may be graphically depicted using the three nested ovals shown in Figure 3.3. Consider the blank background

Figure 3.3
Clarifying Content Priorities



Familiar with
- Key figures who contributed to the development of modern statistics (Blaise Pascal and Lewis Terman)
- All nonessential terminology, for example, interquartile range (no need to be able to define these)

Important to know and do K S
- Measures of central tendency: mean, median, mode, range, standard deviation
- Data displays: bar graph, line plot, box and whiskers plot, stem and leaf plot
- Various statistical formulae and techniques

Big Ideas U
- "Average," range, degrees of confidence, lying with statistics, valid model, reliable data

Big Ideas framed as Understandings
- Statistical analysis often reveals patterns that prove useful or meaningful
- Statistics can conceal as well as reveal
- Abstract ideas, such as fairness, can be modeled statistically

Core Tasks
- Choosing the appropriate measure of central tendency in various real-world situations
- Critique of real-world statistical analyses and misleading graphs

outside the largest circle as representing the field of all possible content (e.g., topics, skills, resources) that might be examined during the unit or course. Clearly, we cannot address it all, so we move within the outer oval to identify knowledge that students *should be 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 unit on statistics, we may want students to become aware of key historical figures, including Blaise Pascal and Lewis Terman, along with the history of the bell curve. Broad-brush knowledge, assessed through traditional quiz or test questions, would be sufficient, given the introductory nature of the unit.

In the middle oval we sharpen and prioritize our choices by specifying important knowledge, skills, and concepts that have connective and transfer power, within this unit and with other units of study on related topics. For instance, we would expect students to come to know measures of central tendency (mean, median, mode, range, quartile, standard deviation), and to develop skill in plotting data on various types of graphic displays.

But, again, there is another way to think about the middle oval: It identifies the prerequisite—that is, *enabling*—knowledge and skill needed by students in order for them to successfully accomplish key complex performances of understanding, that is, transfer tasks. For example, a high school mathematics teacher introduces a statistics unit by presenting his students with the following performance task:

> *Your math teacher will allow you to select the method by which measure of central tendency—mean, median or mode—your quarterly grade will be calculated. Review your grades for quizzes, tests, and homework to decide which measure of central tendency will be best for your situation. Write a note to your teacher explaining why you selected that method, and why you believe it to be the most "fair" and "informative" approach to the grade.*

The performance task requires that students really understand these measures of central tendency (so that they can determine the preferred method of averaging and explain why) in a qualitatively different manner than if they simply had to define the terms. In addition, the task is likely to stimulate the students' interest in *wanting* to understand the distinctions, because it is in their interest to do so. (We say more about framing goals as performance tasks later in this chapter.)

The innermost oval requires finer-grain decisions. This is where we select the Big Ideas that will anchor the unit or course, and also specify the transfer tasks at the heart of this subject. Continuing with the statistics unit example, the inner oval would highlight big ideas (e.g., sampling, margin of error, finding patterns in data, making predictions, degrees of confidence) and key performance challenges (e.g., determining the meaning of "average" for a given set of data, developing a "fair" solution).

The three-ovals graphic organizer has proven to be a useful tool for teachers to use when attempting to prioritize the content for a unit or course. In fact, many users have observed that they were able to eliminate some things that they "always taught" once they realized that these things fell in the outer oval and deserved minimal attention compared with more important ideas and processes. (By the way, the same tool has been used at the macro level for conducting a curriculum audit. In other words, what are the priorities reflected in our current curriculum? Are we properly concentrating on important, transferable ideas, or does our curriculum merely cover lots of information?)

More tips for finding big ideas

In addition to the three-ovals organizer, we recommend that curriculum designers consider the following strategies for identifying big ideas.

1. Look carefully at state standards. Many of them either state or imply big ideas, especially in the descriptive text that precedes the list of standards. For example, look at the explanations in these Ohio standards in economics and physical science (we've added emphasis to highlight various big ideas):

> *Students use* economic reasoning skills *and knowledge of major economic concepts, issues and systems in order to make informed choices as producers, consumers, savers, investors, workers and citizens in an interdependent world.*
>
> *By the end of the K–12 program:*
>
> *A. Explain how the* scarcity of resources requires people to make choices *to satisfy their wants.*
>
> *B.* Distinguish between goods and services *and explain how people can be both buyers and sellers of goods and services.*
>
> *C. Explain ways that people may obtain goods and services.*
>
> *Students demonstrate an understanding of the composition of physical systems and the concepts and principles that describe and predict physical interactions and events in the natural world. This includes* demonstrating an understanding of the structure and properties of matter, *the properties of materials and objects,* chemical reactions *and the* conservation of matter. *In addition, it includes understanding the* nature, transfer and conservation of energy; *motion and the forces affecting motion; and the nature of waves and interactions of matter and energy.*

Or consider these 6th grade social studies standards from California (again, we've added emphasis to highlight big ideas):

1. *Students describe what is known through* archaeological studies *of* the early physical and cultural development of humankind *from the Paleolithic era to the agricultural revolution.*

> • *Describe the* hunter-gatherer societies, *including the development of tools and the use of fire.*
>
> • *Identify the locations of human communities that populated the major regions of the world and* describe how humans adapted to a variety of environments.

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