What Are the Essential Elements of Concept-Based Curriculum Design?

Deep learning, big ideas, "Aha!" moments—most educators aim for a level of comprehension that moves beyond simple memorization. We want our students to not only retain what we've taught them but relate it to other things they encounter, using each new situation to add nuance and sophistication to their thinking. We want to empower them and foster a love of learning. Along with dozens of teachers we know, we have spent countless hours trying to find strategies that build a depth of understanding. But we also know from a mountain of research that the average classroom has remained remarkably unchanged over the past 100 years. The content addressed and level of thinking required continue to largely remain at the surface level (Hattie, 2012; Mehta & Fine, 2015).

Why is there such a considerable gap between aspirations for deep learning and classroom reality? This is the million-dollar question—and we don't want to oversimplify the answer. But we believe that a big factor is a lack of practical, concrete tools for teachers. The methods created by H. Lynn Erickson and Lois A. Lanning are the most powerful and clear ways to design curriculum to allow students to transfer their learning to new contexts. This chapter provides a review of their work and is intended to emphasize key points about unit planning before we move into lesson planning and formative assessments. For more in-depth coverage of these topics, we recommend that educators reference the latest book coauthored by Erickson, Lanning, and French: *Concept-Based Curriculum and Instruction for the Thinking Classroom* (2017).

This chapter reinforces the following principles of Concept-Based Curriculum design:

- The traditional coverage-based curriculum model, which relies on students "doing" verbs with content, rarely produces deep or transferable learning.

- Concept-Based units focus on using content—topics, facts, and skills—to investigate the relationship among concepts.

- Uncovering the relationship among concepts produces learning that can transfer to new situations and helps students unlock novel problems.

- Planning a Concept-Based unit requires teachers to engage in synergistic thinking—the cognitive interplay between the lower and conceptual levels of thinking—to discern the concepts and conceptual relationships at the heart of the unit; there are no shortcuts.

- Concept-Based planning requires that time and effort be devoted to crafting, revising, and polishing factual, conceptual, and debatable questions.

Knowledge and Understanding

The first important distinction is the one Erickson and Lanning make between traditional, coverage-centered curriculum and one that fosters deeper levels of understanding. What does that mean, exactly, to go beyond surface levels of knowing?

One of the most powerful pieces of research in education is Anderson and Krathwohl's *A Taxonomy for Learning, Teaching, and Assessing* (2001). Nearly every trained educator has some knowledge of Bloom's taxonomy and the hierarchy of different types of thinking—from recall to analysis or synthesis. The first taxonomy was published in the 1950s. Many educators also know that there is a revised Bloom's taxonomy, created by a team led by Lorin Anderson, who worked closely with Bloom on the original version. Figure 1.1 demonstrates how the revised version made minor changes to the *thinking hierarchy,* such as replacing "knowledge" with "remembering" and replacing "synthesis" with "creating," which it now places at the highest point.

FIGURE 1.1   BLOOM'S TAXONOMY REVISION
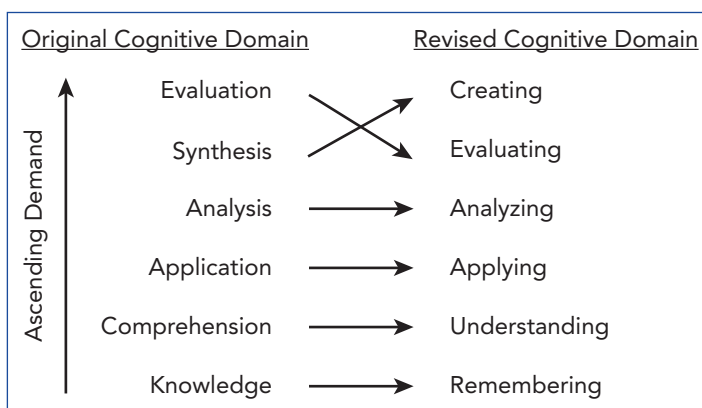
Adapted from Anderson & Krathwohl (2001).

Most educators are familiar with this shift, which reminds teachers that creating new knowledge is the most demanding cognitive process, while simple recall is the least demanding. Fewer educators, though, have considered the other major change to Bloom's taxonomy: the *knowledge dimension.* Anderson and Krathwohl (2001) took "knowledge" out of the cognitive domain and added it as a separate dimension, recognizing four distinct types: factual, conceptual, procedural, and metacognitive.

See the full taxonomy revision in Figure 1.2. Notice that instead of six ways to think about one type of knowledge, there are six ways to think about four distinct types of knowledge. This is key!

FIGURE 1.2   ANDERSON AND KRATHWOHL'S (2001) COGNITIVE AND KNOWLEDGE DIMENSIONS

Knowledge Dimension	Cognitive Process Dimension					
	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual Knowledge						
Conceptual Knowledge						
Procedural Knowledge						
Metacognitive Knowledge						

SOURCE: Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives.* New York: Longman.

What is most important for Concept–Based teachers to take away from this revised taxonomy?

- This is further, rigorous research that supports the importance of helping students organize information and make connections between abstract concepts to gain more insight into the disciplines. Simply trying to match higher ordered thinking skills with facts is not going to produce deep learning that transfers.

- Erickson uses slightly different terminology: Facts correspond to knowledge and concepts correspond to *understanding.* Factual knowledge doesn't transfer but conceptual understanding does.

- Instructional strategies should match the knowledge type and cognitive process of the learning goal. For instance, if the goal is for students to remember facts, teachers may ask students to use a mnemonic device. But if the goal is to apply concepts, this strategy won't work.

- Assessments should align to the knowledge types and cognitive processes taught. Teachers are bound to get poor results when their instruction is mainly at the remembering, factual level, but their assessments demand that students evaluate conceptual ideas.
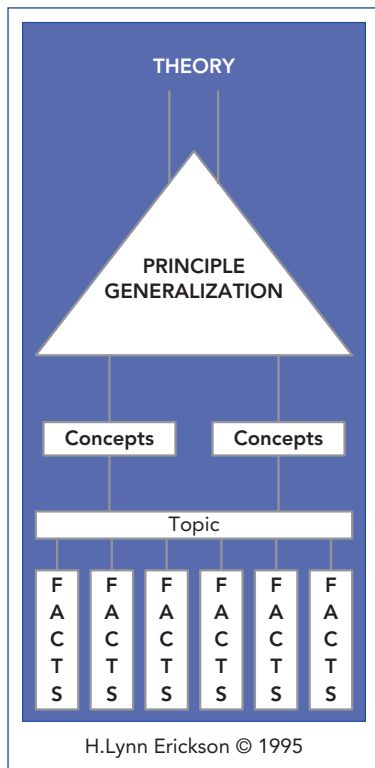
The new taxonomy is useful in many ways. We love how it reminds teachers to be strategic about both *how* they want students to think (the cognitive dimension) and *what* they want students to think about (the knowledge dimension).

The taxonomy also has its limitations. For instance, it does very little to illuminate the *relationship* among facts, concepts, procedures, and metacognitive awareness. While a hierarchical relationship among cognitive processes is implied, the knowledge dimension does not provide much insight into the nature of each type of knowledge and even gives the false sense that facts, concepts, procedures, and metacognition are completely separate entities. Let's take a look at Erickson's depiction of the Structure of Knowledge, which predates the revised taxonomy. It is simpler than the revised taxonomy and offers greater insight into the *relationship* between factual knowledge and conceptual understanding.

The Structure of Knowledge

Using a very straightforward and powerful graphic, Erickson shows us how knowledge is structured and provides a visual that helps us to see the *interplay* between factual knowledge and conceptual understanding. Review Figure 1.3 and notice the choice of language here. While Anderson and Krathwohl use the term "knowledge" to describe both facts and concepts, Erickson reminds us of the need to distinguish between factual *knowledge* and conceptual *understanding.* The Structure of Knowledge visual also reminds us that conceptual understanding is built by abstracting "up" from factual knowledge or examples to understand the relationship among concepts.

FIGURE 1.3   ERICKSON'S STRUCTURE OF KNOWLEDGE

THEORY

PRINCIPLE
GENERALIZATION

Concepts   Concepts

Topic

FACTS FACTS FACTS FACTS FACTS FACTS

H. Lynn Erickson © 1995

SOURCE: Erickson, H. L. (2008). *Stirring the head, heart, and soul: Redefining curriculum, instruction, and concept-based learning* (3rd ed.). Thousand Oaks, CA: Corwin.

Upon reflection, we can easily see how most curriculum design models stop at the topical level. For instance, many curriculum documents list learning goals and activities related to the Enlightenment in social studies, the digestive system in science, or three-dimensional shapes in geometry. Typically, these topics frame a set of facts. Both the topics and facts are locked in time, place, and/or situation. And although they are often paired with a

thinking skill—*identify, analyze, evaluate, solve*—they are too specific to allow students to transfer their learning to new situations. When exposed to this type of curriculum, some students are able to abstract to the conceptual level on their own, generalizing about how *intellectual movements* work in social studies after studying the Enlightenment, how *systems* work in science after studying the digestive system, or how *volume* works in mathematics after learning the equation $V = \frac{4}{3}\pi r^3$, but we should not and cannot leave this to chance.

Some curriculum documents go further up the Structure of Knowledge to the level of concepts: change, pattern, systems. Concepts are mental constructs that are abstract, timeless, and universal (Erickson & Lanning, 2014, p. 33). They transfer to multiple situations. But what allows students to transfer their understanding to new situations is the *relationship* between two or more concepts, known in Erickson's work as

> **What allows students to transfer their understanding to new situations is the *relationship* between two or more concepts.**

generalizations or principles. To emphasize the importance of this point, we will refer to these as statements of conceptual relationship or, simply, conceptual relationships.

The importance of the conceptual relationship level (principles and generalizations) on the Structure of Knowledge cannot be overemphasized. Students must understand two or more concepts and state them *in relation* to one another. If students can define and identify change or patterns but not understand them in relation to other universal or disciplinary concepts, they will still struggle to solve a complex problem involving change or patterns in the future.

Erickson and Lanning (2014) made another important distinction about different types of concepts. Concepts such as change, pattern, and system are extremely broad and can be applied across disciplines—for this reason they are called macroconcepts. Many educators hope students will make connections across disciplines, and this is certainly a very worthy goal. At the same time, we want to note that the beauty of Concept-Based Curriculum is that it includes the ability to transfer ideas *within* the disciplines. More disciplinary-specific ideas are called microconcepts. We need microconcepts to achieve disciplinary depth (pp. 40–41).

Consider the example of a common beginning algebra unit, Straight-Line Graphs, in Figure 1.4. Think about how the *statements of conceptual relationship* allow students to transfer understanding of straight-line graphs to new situations within the discipline of mathematics. Knowing the definitions of the concepts on their own is not enough.

And consider the example in Figure 1.5 from a typical social studies curriculum. Most curriculum documents will outline the key examples (facts) and topics to be studied, and it may be obvious to students that the concepts of freedom and conflict lie at the heart of the situation. But think about the difference between asking questions about concepts (*How does the story of "Bleeding Kansas" relate to conflict?*) and asking questions about the *relationship* between concepts (*How does "Bleeding Kansas"*
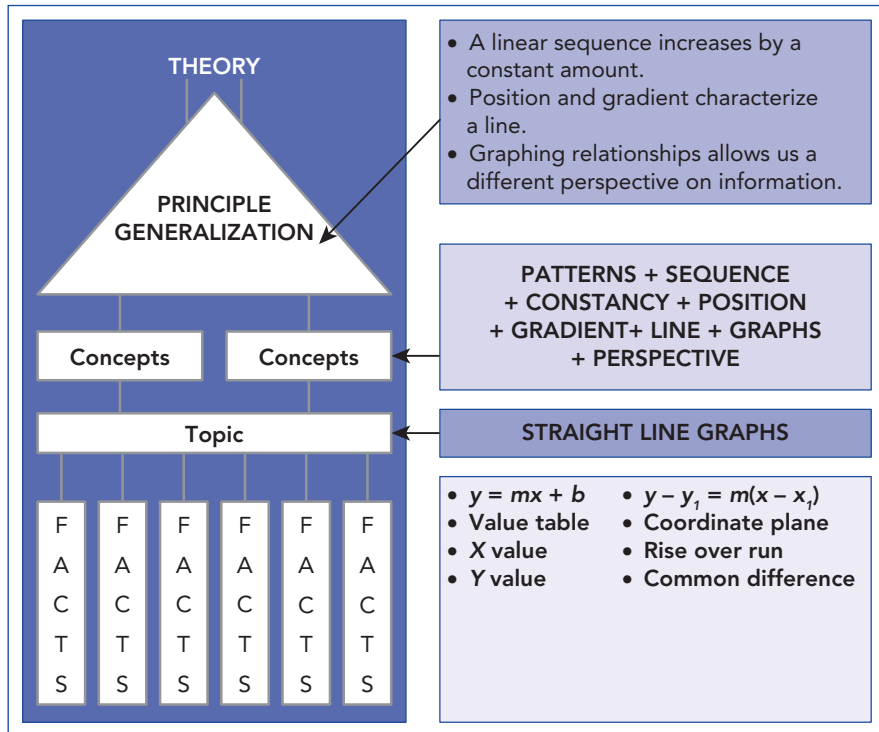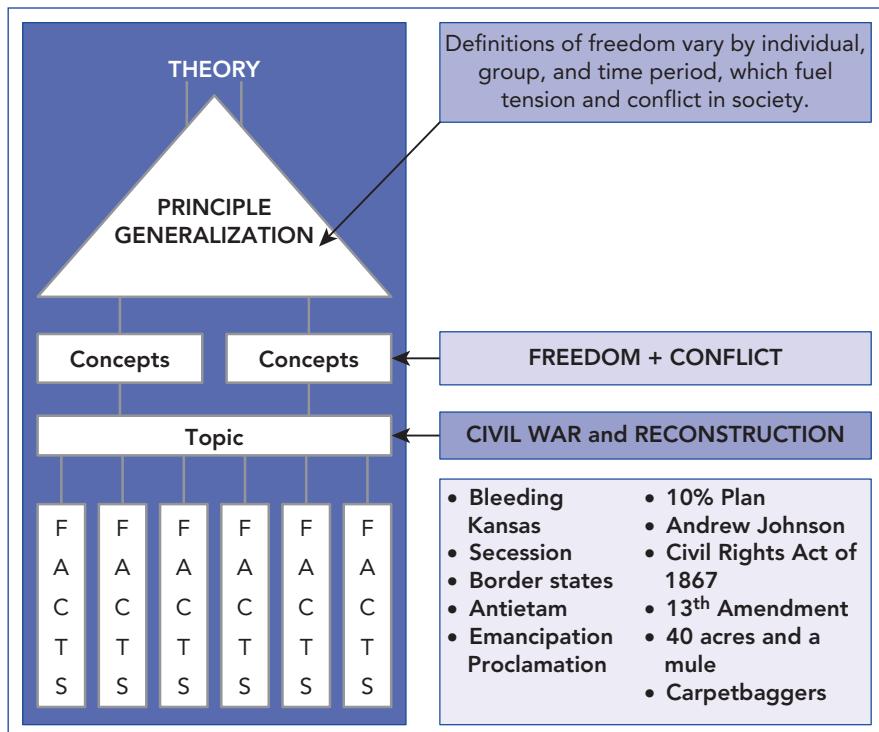
FIGURE 1.4   CONCEPTUAL RELATIONSHIPS IN ALGEBRA

THEORY

PRINCIPLE
GENERALIZATION

- A linear sequence increases by a constant amount.
- Position and gradient characterize a line.
- Graphing relationships allows us a different perspective on information.

Concepts   Concepts

PATTERNS + SEQUENCE
+ CONSTANCY + POSITION
+ GRADIENT+ LINE + GRAPHS
+ PERSPECTIVE

Topic

STRAIGHT LINE GRAPHS

FACTS FACTS FACTS FACTS FACTS FACTS

- $y = mx + b$
- Value table
- X value
- Y value
- $y - y_1 = m(x - x_1)$
- Coordinate plane
- Rise over run
- Common difference

FIGURE 1.5   CONCEPTUAL RELATIONSHIPS IN SOCIAL STUDIES

THEORY

PRINCIPLE
GENERALIZATION

Definitions of freedom vary by individual, group, and time period, which fuel tension and conflict in society.

Concepts   Concepts

FREEDOM + CONFLICT

Topic

CIVIL WAR and RECONSTRUCTION

FACTS FACTS FACTS FACTS FACTS FACTS

- Bleeding Kansas
- Secession
- Border states
- Antietam
- Emancipation Proclamation
- 10% Plan
- Andrew Johnson
- Civil Rights Act of 1867
- 13th Amendment
- 40 acres and a mule
- Carpetbaggers

*help us understand the larger relationship between **freedom** and **conflict**?).* The latter is a much more powerful tool for illuminating meaning that applies across time, place, and situation. Understanding that different views of freedom fuel conflict can help students better understand everything from the spread of ISIS in the Middle East to their own battles over curfew times.

Erickson's Structure of Knowledge and corresponding definitions show us how facts, which are concrete and specific, relate to other key components of a good curriculum: topics, concepts and conceptual relationships.

Clarifying Transfer: The Ultimate Goal of Concept-Based Curriculum and Instruction

Whenever we ask teachers *why* students need to know what they're teaching, we get a variety of answers. For some, the topics or facts seem important in and of themselves. "Kids *must* read and learn *Hamlet* because it's one of the most significant and well-known literary works in existence," an English teacher may say. But, most often, we hear teachers say that the content they teach should help students lead productive lives in the future. They want students to be strong thinkers, problem solvers, readers, writers, and speakers. They want kids to see the world differently, and to be empowered to act differently, because of what they have learned. It seems that the goal of all learning—not just Concept-Based learning—is transfer.

The key to understanding transfer is this: Facts and topics do not transfer. By this we mean that facts and topics cannot be applied directly to a new situation. Whenever we try to apply our insights from one situation to another we are *always* abstracting to the conceptual level, generalizing from a specific instance to a broader rule, before our knowledge helps us unlock the new situation.

> The key to understanding transfer is this: Facts and topics do not transfer.

Our brains are wired for this process. A toddler, after tasting peas and broccoli, is hesitant to try spinach; he has created a generalization that relates taste and color to help guide his decisions when faced with a new vegetable. Another child predicts that the princess will be rescued from the clutches of the evil queen after watching several Disney movies where "good triumphs over evil." We move naturally between factual instances and the conceptual rules or patterns that make up the logic of our world.

The problem is, if we remain at the topic and factual level, students stop trying to derive larger principles about what they're learning. By the time they reach middle school, they have been conditioned to retrieve knowledge on cue without deep understanding. But we continue to expect transfer. Knowing that students read *Hamlet* last year, we assume they will have more insight into *Romeo and Juliet.* Once they've learned to

perform calculations involving fractions, we expect them to solve a word problem that asks them to cut a recipe in half or to double it. We're surprised when learning doesn't transfer in these ways. Too often, we assign students a poor grade and move on.

The great thing about conceptual learning is that it makes visible and concrete the process by which we turn our knowledge of facts into transferable, conceptual understandings. If students use their reading of *Hamlet* to investigate the relationship between the concepts of free will and fate, spending considerable time refining their generalizations about these concepts, they will more readily recognize their generalizations at work when they read *Romeo and Juliet*. And when young math students use their study of fractions to investigate the relationship between multiplication and division, rather than just memorizing the algorithms, they are more capable of attacking a tough word problem where the appropriate algorithm is not obvious.

These are examples of *academic transfer,* meaning the transfer of understanding from one school assignment to the next. When we talk about transfer of learning in this book, we are also talking about *transfer to real-world situations or problems.* This means that students' understanding of conceptual relationships should alter how they see the world *beyond* the walls of the classroom and how they solve problems that occur outside the neat, teacher-constructed parameters of an academic exercise. For us, the ultimate goal is not just to transfer understanding from the study of *Hamlet* to the study of *Othello.* It's great for students to understand how views of free will and fate impact the characters of these plays, but it's even better when they can apply these insights to solving, say, the high school dropout crisis by recognizing that students' decisions to drop out are related to the degree to which they see themselves as fated to fail.

Notice that *conceptual transfer* is different from *making connections.* Teachers often ask students to make topical or factual connections to extend learning and make it meaningful. For instance, when her class is studying the impact of drugs on the body, a health teacher may ask students to read articles about the problem of opioid addiction and decide whether they would support a law that prohibited doctors from prescribing opioid medicines for periods longer than five days. Clearly, students must draw on what they know to respond to this assignment. But they are not asked to draw on *concepts;* rather, they are asked to rely on facts about the topic of drug addiction. Conceptual transfer only occurs when students apply insights about the relationship among concepts to a new scenario.

Educational researcher John Hattie's (2012) work supports the claim that conceptual understanding is key to transferring learning to new situations:

> We come to know ideas, and then we can be asked to relate and extend them. This leads to conceptual understanding, which can in turn become a new idea—and so the cycle continues. These conceptual

Conceptual transfer only occurs when students apply insights about the relationship among concepts to a new scenario.

understandings form the "coat hangers" on which we interpret and assimilate new ideas, and relate and extend them. (p. 115)

Hattie (2012) said there are three distinct levels of learning: surface, deep, and transfer, as shown in Figure 1.6. All three levels are essential, and we reiterate that point later in the section titled "Synergistic Thinking." Hattie and his coauthors stated, "Together, surface and deep understanding lead to the student developing conceptual understanding" (Fisher et al., 2016, p. 61). They agreed that "the ultimate goal, and one that is hard to realize, is transfer. When students reach this level, learning has been accomplished" (Fisher et al., 2016, p. 19).

FIGURE 1.6   SURFACE, DEEP, AND TRANSFER LEARNING
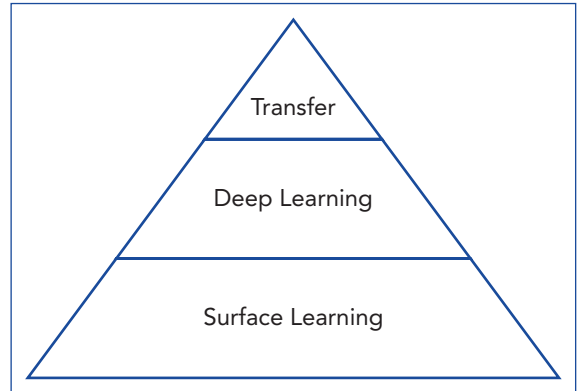
SOURCE: Fisher, D., Frey, N., & Hattie, J. (2016).

In the 1980s, researchers Perkins and Salomon (1988) coined a distinction between what they call low-road transfer and high-road transfer. Essentially, when tasks remain similar to one another, this is known as low-road transfer. When students are asked to transfer knowledge to dissimilar tasks, which requires them to increasingly generalize concepts, they are performing high-road transfer. For those who agree that the 21st century demands innovation, this thinking by the titans in educational

FIGURE 1.7   REAL-WORLD HIGH-ROAD TRANSFER
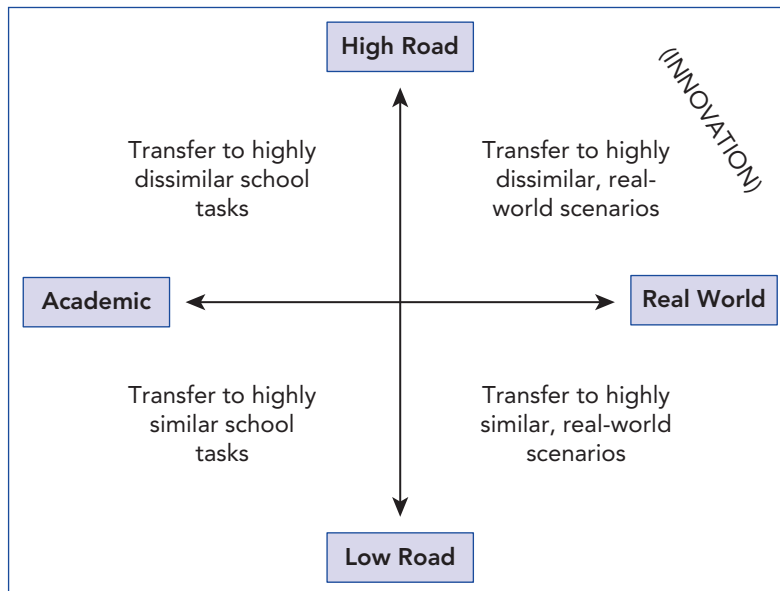
SOURCE: © Stern, Ferraro, and Mohnkern, (2016).

research cannot be ignored. Innovation is high-road, real-world transfer of learning. And it is done at the conceptual level.

We've combined Perkins and Salomon's high-road and low-road transfer with our academic and real-world transfer to illustrate the key to fostering innovation. Formal schooling needs to live in all four quadrants because a deep foundation of facts or surface-level learning is key for deep learning, transfer, and innovation. But the point is that the upper right quadrant is where innovation happens, as shown on the previous page in Figure 1.7. And we will show you how to reach it!

The Structure of Process

Lois A. Lanning is an expert in the field of literacy. She points out that there is a difference among the traditional subjects or disciplines taught in schools. Some are more knowledge based, such as mathematics, science, and social studies, each with their own set of facts that were discovered by experts in the field. Other disciplines are more process based, focused on processes, strategies, and skills rather than concrete knowledge. In these disciplines, the experts apply a complex process to *produce* an end result. These are language, music, theater, dance, and visual arts.

Teachers of these subjects sometimes try to shoehorn their content into the knowledge-based model, leading them to focus their instruction on the characters and plots of Shakespeare, the colors and shapes of Picasso's Blue Period, or in-depth analysis of Mozart's symphonies. These are important elements to any arts curriculum. But the heart of the curriculum is the complex process that the experts in the fields *do:* the writing process, the artistic process.

This relates directly back to the revised Bloom's taxonomy, which separates procedural knowledge from the three other types of knowledge. Anderson and Krathwohl (2001) described procedural knowledge as "the knowledge of skills, algorithms, techniques, and methods," as well as "knowledge of the criteria used to determine when to use various procedures" (p. 52). This would include the research process in social studies, the scientific method in science, various methods of literary criticism in English language arts, and the steps involved in asserting a geometric proof in mathematics. However, Anderson and Krathwohl do not fully explain what it takes for students to transfer their knowledge of procedures to new situations.
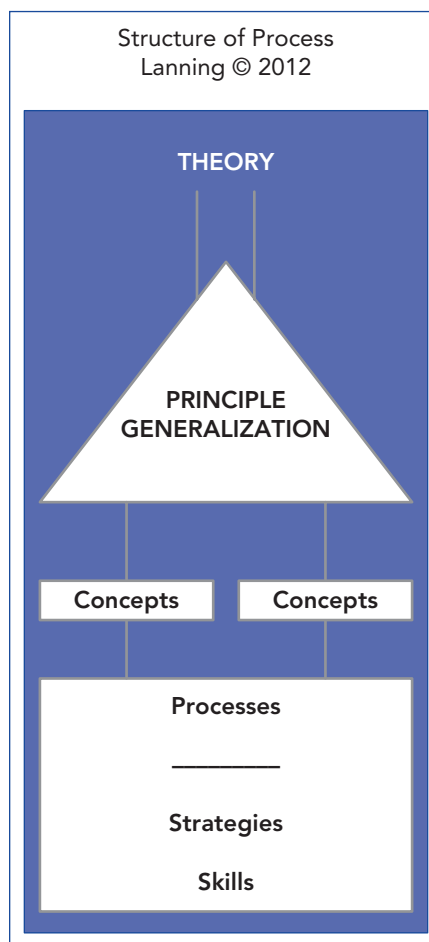
Lanning offers a visual that shows how skills and strategies make up more complex processes, which can be abstracted to statements of conceptual relationship. She explains that understanding conceptual relationships helps students "move from 'doing' to 'understanding' *why* we do what we do" (Erickson & Lanning, 2014, p. 44).

For instance, students who understand that *writers introduce and respond to counterarguments in order to make their own claims more convincing* are more likely to transfer the strategies and skills associated with making counterarguments to new situations because they understand *why* this is important and how strong counterarguments are constructed.

In the same way that Erickson's Structure of Knowledge makes clear the relationship between factual knowledge and conceptual understanding, Lanning's Structure of Process, shown in Figure 1.8, makes clear the relationship between processes and conceptual understanding.

Erickson and Lanning (2014) noted that, although some disciplines are more process oriented than others, "we should consider both knowledge and processes when designing concept-based curricula" no matter the discipline (p. 49). Obviously, the balance between knowledge and processes will depend on the nature of the discipline itself. This is why Lanning's work on the Structure of Process is so important. Process is, to varying degrees, an essential component of every discipline.

SOURCE: Lanning, L. A. (2013). *Designing a concept-based curriculum for English language arts: Meeting the Common Core with intellectual integrity, K-12.* Thousand Oaks, CA: Corwin.

Synergistic Thinking

So far in this chapter we have emphasized conceptual relationships, as they relate to both knowledge and processes, as the most important components of a good curriculum. While traditional curricula emphasize facts, topics, and isolated skills, we assert that in order to make these types of knowledge meaningful and transferrable, we must push students to engage with the upper levels of the Structure of Knowledge and Structure of Process.

However, we want to emphasize that this does *not* mean that facts, topics, and skills are unimportant. In fact, the dichotomy between teaching facts and skills or teaching big ideas and concepts is a false one. Students must use facts to discover conceptual relationships. And once they do that, they should use additional facts to deepen their

> The dichotomy between teaching facts and skills or teaching big ideas and concepts is a false one. Students must use facts to discover conceptual relationships.

conceptual understanding. It is the strategic inter–play between the lower level and conceptual levels of thinking that we're aiming for.

Consider the sets of facts and the corresponding concepts in Figure 1.9. Ask yourself this: How do the concepts help organize and illuminate the meaning of the facts? How do the facts encourage deeper, more nuanced understanding of the concepts?

FIGURE 1.9   SAMPLE TOPICS, FACTS, AND CONCEPTS

Course	Topic	Facts/Examples	Concepts
Geometry	Triangles	Side-side-side theorem Side-angle-side theorem	Proportionality Similarity
Chemistry	Acids and bases	pH scale Equilibrium constants (Ka, Kb) Strong acid/base Weak acid/base	Systems Equilibrium Disassociation Neutralization
Music	Classical period music	Mozart's Symphony No. 40 Beethoven's Piano Sonata No. 14	Time Rhythm Melody
Health and Physical Fitness	Basketball	Dribbling Layup Jump shot	Offensive versus defensive movement Systems
English Language Arts	Shakespeare	*Macbeth* King Duncan *Hamlet* Act II, Scene ii	Character Tragedy Text structure
Spanish	Subjunctive tense	Specific verb conjugation charts Ir Venir	Time Emphasis Verb aspect
Geography	Migration patterns	African diaspora Mexican immigration to the United States	Migration Conflict Choice Resource scarcity
Government	Electoral College	Winner-take-all Swing states *Bush v. Gore*	Proportionality Representation Democracy

Since most curriculum documents emphasize topics and facts, omitting the larger concepts at play, they trap teachers and students in the lower levels of learning. For instance, in a traditional Government unit on the Electoral College (outlined in Figure 1.9), students would likely be expected to memorize terms like "winner-take-all" and to explain the significance of the case *Bush v. Gore*. They would only be processing information at the factual level.

However, Concept-Based units demand that students process information on the factual level *while also* discerning larger patterns and coming to deeper transferable understandings about conceptual relationships. By emphasizing the relationships among concepts as discovered through facts and examples, teachers can encourage the interaction between the factual and conceptual levels of thinking. This interaction is what Erickson (2008) called *synergistic thinking,* and it is essential for deep, lasting learning.

Because synergistic thinking is the heart of conceptual learning, it must also be the heart of Concept-Based planning. Teachers, too, must learn to process their content on both the factual and conceptual levels. They must make personal meaning of the content by thinking through conceptual relationships for themselves. This is one of the biggest challenges of conceptual teaching—the intellectual demand is far greater than that of simply plotting out textbook chapters on a calendar. However, synergistic thinking is also what makes teaching for conceptual understanding more personally satisfying and enriching than teaching through a coverage model.

Unit Planning

So how do teachers use all of these insights—the Structure of Knowledge, the Structure of Process—to design Concept-Based units of study for their classrooms? Erickson et al. (2017) offered some useful tools for this process. They noted that, although there are many possible ways to write a unit plan, most good plans involve the following elements:

- A unit title
- A conceptual lens, concepts, and subconcepts
- A unit web
- Generalizations that put the concepts into relationships with one another
- Guiding questions
- Critical content and key skills that students will need to master
- Learning experiences and lessons
- Assessments: performance tasks and corresponding scoring guides

In a Concept-Based unit, all the parts work together to form a cohesive whole: Students tackle the guiding questions by investigating the critical content using key

skills. For instance, science students tackle the question "*What happens when an ecosystem is disturbed?*" by investigating a few terrestrial ecosystems—tropical rain forests, deserts, and coniferous forests—using the key skill of testing hypotheses. Through their pursuit of the guiding question, students are looking at ecosystems through the conceptual lens of *interdependence* and employing the additional concepts of *change* and *adaptation,* and subconcepts specific to biology, such as *ecological succession* and *cyclical disturbance.* They ultimately come to understand that *when an ecosystem experiences a disturbance, new conditions enable the success of some species while disadvantaging others,* which they use to predict the impact of an underwater earthquake on an ocean ecosystem.

Erickson and Lanning identified 11 distinct steps of the Concept-Based unit planning process, as outlined in Figure 1.10.

We want to emphasize one key point about Concept-Based unit planning: It is hard work! The complex interplay among content, questions, concepts, and skills in a Concept-Based unit makes planning tough. Teachers often struggle to write their own statements of conceptual relationship and to craft conceptual questions. Instead of growing frustrated, though, we hope that Concept-Based teachers draw energy from the challenge of synergistic thinking. Think about the unit planning process this way: You are taking yourself on this intellectual journey so you can later play "tour guide" to students traveling along the same intellectual path.

Common Unit Planning Challenges

How do I think of and select concepts for my course?

- Start with the *bottom* of the Structure of Knowledge: topics and facts. Most teachers are given some direction regarding these components of the curriculum. Perhaps your state has content standards that indicate the major topics of study and factual content students should learn. Maybe you are expected to "cover" a certain set of textbook chapters or list of competencies. Begin here. Use the Structure of Knowledge diagram as a graphic organizer, working your way up.

- The concepts should be inherent in the content of your course and the ways of thinking that are important in your field. If you're having trouble "seeing" the concepts in your unit, start by learning more about the topics you need to teach. Keep asking yourself these questions: Why do kids need to learn this? Why are these topics important? What makes these facts or examples significant? What is the "story" here? What are the larger lessons at play?

- It may help to spiral concepts throughout your course. Bring concepts back up during the year to increase the sophistication of students' understanding. Just be sure that the microconcepts and factual content of later units serve to challenge, deepen, and expand upon understandings derived earlier in the year.

FIGURE 1.10   UNIT PLANNING STEPS

Step 1: Create a unit title.

The unit title can be engaging for students but needs to clearly indicate the content focus.

Step 2: Identify the conceptual lens.

The conceptual lens is a concept that provides focus and depth to the study and ensures synergistic thinking.

Step 3: Identify the unit strands.

Strands will be subject areas for inter-disciplinary units. The strands will be major headings, which break the unit title into manageable parts for intra-disciplinary units. In a process discipline, the strands are defined: understanding, responding, critiquing, and producing. Strands are placed in a web around the unit title.

Step 4: Web out the unit's topics and concepts under the strands.

After brainstorming, underline the concepts under each strand so they can be easily accessed in the next step.

Step 5: Write the generalizations you expect students to derive from the unit study.

Craft one or two generalizations using the conceptual lens, and one or two generalizations for each of the strands. Sometimes a generalization will address one or more strands (especially in a process discipline). A unit of study may have 5–9 generalizations depending on the grade level and length.

Step 6: Brainstorm the guiding questions.

Guiding questions facilitate student thinking toward the generalizations. Guiding questions should be coded as to type (factual, conceptual, debatable). Each generalization needs a mixed set of 3–5 factual and conceptual questions developed during the planning process, and 2 or 3 provocative questions for the unit as a whole.

Step 7: Identify the critical content.

The critical content is the factual knowledge required for grounding the generalizations, deepening knowledge of the unit topic, and defining what students may need to know about processes/skills.

Step 8: Identify the key skills.

The key skills may be drawn verbatim from academic standards or national curricula. Key skills transfer across applications and are not tied to specific topics until they appear in the learning experiences.

Step 9: Write the common, culminating assessment and scoring guide/rubric.

The culminating assessment reveals student understanding of an important generalization (or two), their knowledge of critical content, and key skills. Develop a scoring guide, or rubric, with specific criteria for evaluating student work on the task.

Step 10: Design suggested learning experiences.

Learning experiences ensure students are prepared for the expectations of the culminating assessment and reflect what students should understand, know, and be able to do by the end of the unit. Learning experiences are meaningful and authentic. Included in this section are suggestions for pacing, other assessments, differentiation strategies, and unit resources.

Step 11: Write the unit overview.

The unit overview is written to read to the students to hook or grab their interest and attention and to introduce them to the study.

SOURCE: Erickson, Lanning, & French. (2017). *Concept-Based curriculum and instruction for the thinking classroom* (2nd ed.). Thousand Oaks, CA: Corwin.

- Start big by asking yourself to write one or two sentences that summarize the "story" of your course. What is the one big lesson students should walk away with?
  - Algebra: In this course we learn to leverage known relationships among quantities to find what we don't know.
  - World History: This course is about how empires rise and fall.
  - Biology: This course shows students that all life is interconnected and interdependent.
  - Eighth-grade English: Finding the right words to express yourself can set you free.

What makes a good statement?

- It needs to be significant. If it feels really obvious or simple, it's not done, unless it's something that students often misunderstand or struggle to grasp.
- It needs to be appropriately challenging.
- It needs to be transferable. We need to think of multiple situations in which it holds true.

How do I make my statements better?

- Make sure the statement contains two or more concepts.
- Make sure it is not a skill or something the students will do. Stick to statements that complete this sentence: "Students will understand THAT . . ."
- Avoid weak verbs: is, are, have, affect, influence, impact (Erickson, 2008).
- Ask yourself this: Is this a developmentally appropriate yet sophisticated idea?
- Take the time to think deeply about these statements and to refine them. Put them away for a few hours or a few days and then come back. Make them more specific by asking yourself this: How? Why? Work on clarity, precision, and accuracy. Pay particular attention to the verbs, making sure they are as active and descriptive as possible (Erickson, 2008).
- Learn more! This is the trickiest part of planning a Concept–Based unit. But it is also the most rewarding. Rather than take the topics and facts at face value, you must push yourself to understand them deeply. You may need to do some new learning to uncover the deeper meaning inherent in the content. The harder you work on these generalizations, the more you discuss them with colleagues and test them by reading more widely in your field, the more precious and satisfying they become. And rightfully so—you're constructing knowledge!

Examine the sample statements of conceptual relationship in Figure 1.11. For practice, cover up the column marked "Better Statements" and focus only on the side marked "Weak Statements." Use some of the tips and questions here to improve the weak statements. Then challenge yourself: Can you improve upon the "Better Statements"?

FIGURE 1.11 SAMPLE STATEMENTS OF CONCEPTUAL RELATIONSHIP

Weak Statements	Better Statements
Students will understand the persuasive features advertisers use.	Students will understand that advertisers use persuasive features such as catchy slogans, captivating images, and simple but attractive logos to hook consumers.
Students will understand the relationships among formulas, values, quantities, measurement, and unknowns.	Students will understand that formulas demonstrate the relationship between several quantities. Formulas help us calculate a quantity when all of the values are given or can be easily measured. At the same time, when values are not given or not easily measured, we can use the formula in a different way to find the unknown quantity or quantities.
Students will understand that some processes are part of systems and they can create or destroy.	Students will understand that systems consist of interrelated parts—changes to one part of the system often lead to dramatic impacts on other parts of the system.

How many statements of conceptual relationships are ideal per unit?

- A good rule of thumb is five to nine statements per unit, depending on the unit length and the grade level (Erickson et al., 2017).

How do I write good questions?

- Strive for a balance of factual and conceptual questions that will ensure adequate engagement with both the lower level and conceptual level of learning. Include debatable questions to increase student interest and motivate thinking.

- Conceptual questions should ask about the nature of the *relationship* between concepts. The following question stems might be helpful in getting started. Remember that the blank spaces should be filled in with *concepts,* not facts or topics.

    - *What is the relationship between _____ and _____?*
    - *How does _____ impact _____?*
    - *What effect do _____ and _____ have on _____?*
    - *How do the forces of _____ and _____ interact?*

- Questions should guide students but not be too leading—this is a tough balance. A question should allow students to come up with the answer on their own through illustrative examples. This means that some of the weak verbs that we try to avoid when crafting generalizations—is, are, have, affect,

influence, impact—are appropriate for questions because they leave the question open to many possible answers and approaches. For instance, the question "*Why do changes to the environment force living organisms to adapt?*" is much less open-ended than the alternative, "*How do environmental changes impact the organisms in an ecosystem?*" The first question provides a relationship—*changes to the environment force living organisms to adapt*—without demanding that students uncover it for themselves. Don't rob students of the opportunity to think for themselves.

- Questions can make or break a unit, so take the time to brainstorm and then narrow your questions down. For instance, we might begin with the question "What is the relationship between migration and conflict?" but then refocus it to allow students to attack just one aspect of this relationship: "Does migration inevitably lead to conflict?" There are pros and cons to both narrow and broad conceptual questions. In this case, the narrower question encourages kids to take a side and reconsider their position at various points in the unit without needing much modeling from the teacher. The larger "What is the relationship . . ." question allows for more variety and expansive thinking, but students would likely need more coaching in how to approach it.

Consider the three sets of sample questions in Figure 1.12. What type of thinking does each question encourage in students? Which questions best guide students toward understanding the relationship between two or more concepts? How do the questions in each set work together to guide students to a larger understanding?

FIGURE 1.12   SAMPLE CONCEPTUAL QUESTIONS

- What persuasive features do advertisers use?
- How and why do advertisers use persuasive features?
- What is the relationship between the persuasive features advertisers use and customers?

_____

- What are formulas? Why do we use them?
- How do formulas help us when values are unknown or not easily measured?
- What is the relationship between formulas and unknown quantities?

_____

- How does changing one part of a system impact other parts of the system?
- What happens if one part of a system changes?
- What is the relationship between the parts of a system and change?

Conclusion

We hope this chapter was a helpful review of the most important principles of Concept-Based Curriculum and of the basic steps for planning a Concept-Based unit. What excites us most about this curriculum model is its ability to awaken the potential of young people as intellectuals and as solvers of complex problems. When we envision the type of education that moves beyond rote learning and instead treats students as capable contributors to our global community, Concept-Based Curriculum is at the heart of it. This is because conceptual learning focuses on transferring deep, lasting insights to novel situations instead of "covering" a pile of information or set of discrete learning objectives. It encourages students to uncover meaningful truths and make use of them instead of cramming for tests that have no value beyond the schoolhouse walls.

By no means has this been a comprehensive guide. If you're left yearning for more in-depth explanations and further examples, we recommend that teachers of language (including world or foreign languages) and arts (music, drama, etc.) read Lanning's (2013) *Designing a Concept-Based Curriculum for English Language Arts: Meeting the Common Core With Intellectual Integrity, K-12* and mathematics teachers read Wathall's (2016) *Concept-Based Mathematics: Teaching for Deep Understanding in Secondary Classrooms.* Everyone else should check out Erickson et al.'s (2017) *Concept-Based Curriculum and Instruction for the Thinking Classroom.*

Chapter Review

- What role do facts, topics, and concepts play in a Concept-Based Curriculum? What about skills, strategies, and processes? Why are all of these elements important?

- What does it mean to make *transfer* the goal of learning? Why are concepts essential to the transfer of understanding from one situation to another?

- What are the greatest challenges of planning a Concept-Based unit? Which insights from this chapter might help you get "unstuck" during the tough parts of your planning process?