1 Curriculum Design

From an Objectives-Based to a Concept-Based Model

For decades educators relied on Benjamin Bloom's Taxonomy of Educational Objectives (Bloom, Engelhart, Hill, & Krathwohl, 1956) to write curriculum. The taxonomy brought structure to the thinking dimension of schooling by differentiating levels of cognition from Knowledge to Evaluation. Curriculum committees selected verbs representing the six different cognitive levels to use in writing content objectives. This was a step forward in curriculum design but something still seemed amiss. Just choosing verbs from different levels and attaching them to a topic did not ensure that students were *understanding* the important concepts of a discipline; nor did the objectives alone align with our current research on best practices for supporting teaching and learning. There was more work to do in the field of curriculum design.

In 2001, Anderson and Krathwohl released a significant book updating the work of Benjamin Bloom. *A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives* was a refreshing analysis of Bloom's Taxonomy and a leap forward in the curriculum field because it clearly differentiated between Factual Knowledge and Conceptual Knowledge. They are often quoted by curriculum leaders: "By separating Factual Knowledge from Conceptual Knowledge we highlight the need for educators to teach for deep understanding of Conceptual Knowledge, not just for remembering isolated and small bits of Factual Knowledge" (p. 42). The contributors to Anderson and Krathwohl's edited volume addressed a significant need in designing for learning. If we, as teachers, cannot tell the difference between the factual and conceptual levels of knowledge then how can we teach for the transfer of learning and

deeper conceptual understanding? Anderson and Krathwohl explain the process of "understanding":

> Students understand when they build connections between the "new" knowledge to be gained and their prior knowledge. More specifically, the incoming knowledge is integrated with existing schemas and cognitive frameworks. Since concepts are the building blocks for these schemas and frameworks, conceptual knowledge provides a basis for understanding. (p. 70)

Norman L. Webb (2005) developed a popular tool used in many schools today for understanding increasing Depth of Knowledge levels and for designing related learning activities. This tool relates process verbs to four levels of cognitive complexity (Recall, Skill/Concept, Strategic Thinking, and Extended Thinking) and provides learning activities using the verbs from different levels. This work reinforces the need for educators to deliberately address different levels of cognitive complexity in learning activities. But even though objectives are written with verbs from more complex levels of thinking, they still do not ensure that students are developing deeper levels of conceptual understanding. This is because the focus is more on the verb driving an activity than on the transferable understanding of the idea to be realized. It is for this reason that Erickson and Lanning propose a concept-based model of curriculum design that is idea-centered and moves students from factual knowledge to conceptual understanding.

The journey to this insight into the critical nature of conceptual understanding has been long and winding. Curriculum design has zigged and zagged over the years in response to pressure from things like international competition (the *Sputnik* space race of the 1960s), reports like "A Nation at Risk" (National Commission on Excellence in Education, 1983), and the Third International Study of Mathematics and Science (TIMSS) study (Beaton, Mullis, Martin, Gonzalez, Kelly, & Smith, 1996), which was a driving force behind the STEMs (Science, Technology, Engineering and Mathematics) movement, as well as from the many innovative attempts to "fix education."

A SHORT RETROSPECTIVE, FROM THE AUTHORS, ON EDUCATIONAL SWINGS

Lynn Erickson coined the term *Concept-Based Curriculum and Instruction* in her first book, *Stirring the Head, Heart and Soul* (2008), first published in 1995. To understand the journey to concept-based curriculum and instruction, Lois Lanning and Lynn share their recent dialogue recollecting the pendulum swings in U.S. curriculum design over the past four

decades. This short retrospective can provide a context for their journey into concept-based curriculum and instruction.

Lynn: Do you realize, Lois, that between us we have around seventy-five years of experience in education?! It is interesting to think back on the "pendulum swings" that have taken place over the years. I still remember the "Open Classroom" philosophy which was in full swing in the 1960s and 1970s. *Creativity* was the buzz word of the day. Schools were tearing down walls (or building new schools with minimal wall divisions) to make open space areas for multi-age groupings and movement. Curriculum documents were non-existent or ill-defined.

Lois: Yes, the "Open Classroom" experience . . . As a matter of fact, I vividly remember touring a beautiful new open-classroom private school, built on a picturesque wooded lot with floor-to-ceiling, angular windows allowing sunlight to stream into a totally open inside room with enormously enthusiastic teachers greeting everyone who visited! Students in this school spoke to the teacher on a first name basis—another popular trend at that time. Although the open classroom philosophy had some good points, such as student-centered learning, multi-age classrooms, and self-paced learning, it faded into the sunset all too quickly. Noise levels in the open spaces, as well as a lack of accountability to academic standards eventually led most schools to abandon the idea.

Lynn: It was during the open-classroom years that I heard about the work of Hilda Taba, who recognized the value of concepts and "conceptual main ideas" in designing curriculum and instruction. Taba was very influential in curriculum design during this time. And her research and ideas have been consistently included in curriculum classes at the university level since her death in 1968. She was one of the pioneers in conceptual curriculum design. Taba wrote an elementary social studies program based on her beliefs about the importance of conceptual understanding. Unfortunately, the fervor of the open classroom movement muted Taba's influence in my school. Little did I realize that I would be extending Taba's path for education in my own life's work. By the way, did I ever tell you that the "H" in front of my name stands for "Hilda"? How did my parents know?!

Lois: I wondered what the "H" stood for on your books! Remember when the backlash hit against the "openness" of both society and schools during the late 1970s? The school walls started to go back up and teachers were now required to cover defined "behavioral objectives" in each subject area. These objectives were so specific . . . "Students will compute 3 digit multiplication problems with 80% proficiency." I also remember getting a reading manual that must have been six inches thick identifying every discrete skill students had to learn!

Lynn: Oh yes! I was teaching a Grade 1/2 combination class and remember being handed a large box of behavioral objectives for reading accompanied

by a foot-long metal rod. We were to feed the rod through holes in light cardboard folders that contained skill sheets for our reading objectives. Oh how I hated those drill-and-kill sheets! But I did as I was told even though I didn't see how these sheets were developing the minds of my students—or their reading abilities for that matter. As I look back, it is a wonder one of my students didn't get hold of the rod and stab a classmate.

Lois: My big worry was getting my students to read one side of a card up to a certain color level in our reading program box and answer the three questions on the back of the card correctly. I had nightmares about students groaning when I pulled it out each day, but their color levels were part of my evaluation! I knew there had to be a better way . . .

Lynn: I remember those colored cards and questions too. I think the goal was to "teacher-proof" the curriculum! In the early 1980s we were still writing content and skill objectives, and Bloom's Taxonomy of verbs was the extension of the curriculum writer's arm. I led committees of teachers in writing curricula composed of "cutting edge" objectives using "higher-level" Bloom verbs. We were so proud of our work! We had wars, dates, and historical events nailed in our documents. No stone in content was left unturned. But we sent them out to teachers and they promptly ended up in a bottom drawer, or worse yet—in the round file by their desk.

Lois: Bloom's Taxonomy at least got me thinking about how I wanted my students to be able to think . . . it was a beginning, but you are right, just using a high-level verb came with no guarantees of deeper levels of understanding.

Lynn: Yes, it seemed as if something was missing as we covered the objectives, but the missing element was elusive. Do you remember the era of *Transformational Outcome-Based Education* in the late 1980s and early 1990s? It was another huge shift in curriculum design theory that threw out the traditional structure of disciplines where knowledge builds on itself in a defined way. Instead, proponents advocated that curriculum be developed around broad life themes such as working in collaborative groups or understanding diversity. Curriculum was designed from complex role performances aligned to the themes for living rather than by traditional subject area designations. The proposed radical restructuring of curriculum design drew the wrath of some groups in society who accused the schools of "taking over the minds of children," and "failing to teach facts." As a curriculum director I was called before more than one group to reassure parents and explain that our district curriculum model was indeed teaching reading, writing, arithmetic, and the facts.

Lois: Actually, I think this was about the time when many people started raising more questions about teaching and learning. Standards began to come into the conversations.

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Lynn: Yes, it was also during this era that I became aware of the value of concepts in the design of curriculum. We did identify the kinds of outcomes we wanted for our students in terms of being "quality thinkers" and "collaborators," but realized that we could best accomplish these ultimate outcomes through a curriculum design that framed critical factual knowledge and skills with related concepts. For the eight years that I served as curriculum director, we developed all of our K–12 curricula in a concept-based format—though we did not write conceptual understandings (statements of relationship between disciplinary concepts) since I had not yet reached that level of enlightenment in my own journey. You know, even though the educational swings over the years seemed to take us off track for a time, each movement brought us something of value that has eventually taken us to a new level of quality curriculum and instruction. Progress is not a straight line.

Today there is a growing realization among educators that curriculum and instruction must move beyond knowledge and skills to include the deeper, transferable understandings realized at the conceptual level of thinking. We believe strongly that there are two paramount reasons for this movement:

As knowledge continues to expand exponentially we must move to a higher level of abstraction (concepts) to focus and process the information so it can be thoughtfully and efficiently accessed and utilized.

Developing the students' ability to think well in order to solve complex problems and create new ideas requires a more sophisticated curriculum and instruction model—a model which encourages "synergistic thinking." When a person is thinking synergistically there is a cognitive interplay between the factual and conceptual levels of knowledge and understanding. This interplay stimulates higher order thinking and leads to deeper understanding of both the facts and concepts (Erickson, 2007).

Concept-based curriculum models, by design, deliberately include the conceptual dimension, which is imperative for stimulating synergistic thinking. Concept-based models differentiate clearly between what

students must Know factually, Understand conceptually, and be able to Do in processes, strategies, and skills. Traditional curriculum models refer to what students must Know and be able to Do, but too often fail to highlight Understanding as a third expectation. Perhaps this was because loud voices in the late 1980s and early 1990s said, "Do not use the word *Understand* in curriculum design because it cannot be assessed." This had a detrimental effect on curriculum design for many years. We still remember teachers during the late 1990s who expressed concern about using the term as we referred to the importance of conceptual "understanding" in our workshops. It is true that it is easier to assess factually specific knowledge, but a myopic allegiance to factual knowledge alone means we remain locked in a lower-level coverage model for curriculum and instruction.

Of course "understanding" can be assessed! Assessment for understanding uses factually specific information to support conceptual understanding, as well as for assessing the quality of thinking brought to the task. Assessments that call for the transfer of understanding through time, across cultures, and across situations also indicate depth of understanding. It is clear that the call for evidence of deeper understanding in education today requires changes in traditional assessment practices.

Synergistic thinking stimulates higher-order thinking and leads to deeper understanding of facts, skills, and concepts.

THE VALUE OF KNOW, UNDERSTAND, AND ABLE TO DO IN CONCEPT-BASED MODELS

A clear presentation of the curriculum components, referred to as KUDs (Know, Understand, and able to Do) in concept-based models benefits the following constituents in the educational family:

Teachers

KUDs provide teachers with clear indicators to guide instruction, but they also . . .

- move teachers along the continuum in understanding the difference between a topic-based versus the concept-based model for teaching and learning by providing quality examples of conceptual understandings that are supported by the factual knowledge and skills.

- raise the bar for instruction by shifting the focus from *covering* facts and skills—to *using* facts and skills to understand concepts and conceptual understandings.
- create alignment between a concept-based pedagogy and the curriculum design that drives that pedagogy. If we want to teach for conceptual understanding then we need to see those understandings articulated to guide our instructional planning.

Students

When teachers design learning experiences that employ KUDs and concept-based pedagogy students will benefit because . . .

- factual knowledge and skills will be processed interactively and iteratively with a related concept or concepts in each student's mind as he or she constructs personal meaning and understanding. This synergistic thinking process develops the intellect and motivates the student for learning. The thinking of each child is valued. For example, inviting students to consider the issue of "Climate Change" through the conceptual lens of "Evidence/Perspectives" puts them in the driver's seat for the inquiry and tells them that the teacher is interested in how they interpret the topic of Climate Change when played against the lenses of Evidence and Perspectives. The students are intellectually and emotionally engaged in the study because they are invited to think for themselves as they consider the factual knowledge in relationship to the conceptual lens.
- collaborative work groups will engage children in the social construction of meaning as they question, discuss, explore, and create products and solutions to interesting problems and issues.
- learning to think beyond the facts and transfer concepts and understandings through time, across cultures, and across situations expands the worldview of students, helps them see patterns and connections between new knowledge and prior knowledge, and provides the brain schemata to support lifelong learning.

Administrators

KUDs provide clear indicators for principals and instructional coaches on what students need to be learning. These indicators, along with the administrator's understanding of concept-based pedagogical requirements, provide the foundation to support each teacher in developing into a master concept-based instructor.

Parents

When curriculum documents clearly indicate what students must know, understand, and be able to do, parents have more complete information to be assured their children are receiving a quality education. When they understand that their children are not only learning critical facts and skills, but are also developing a deep understanding of the underlying concepts, they realize that today's students are learning more than *they* had been taught. By hearing their children talk about concepts and relate factual information to conceptual understandings at the dinner table, they hear the evidence of what their children Know, Understand, and are able to Do.

The following is the recollection of a student, Connor Cameron, now a junior in high school, who experienced learning in a concept-based classroom in his eighth-grade science class. He was describing the project as one he especially enjoyed. Notice how the concept-based instruction kept him motivated and engaged in his learning and what he still remembers after three years. See if you can identify what Connor knew factually, understood conceptually, and was able to do in skills and processes. Where did Connor show evidence of transfer of learning?

My science teacher, Mr. Presho, at Brier Terrace Middle School in Brier, Washington, gave us a project to create a device that could be placed into a fish tank with 18 inches of water and move from the surface to the bottom at least 3 times. After giving that prompt he basically left us to find a creative solution to this problem. I realized that I had to figure out a way to have the submarine raise and lower its average density so it could float and sink in an automated fashion. After having some experience with the process of electrolysis from a previous science fair project, I realized that I could use that process to create a gas while under water. That process would be the mechanism with which I would lower the overall density of the submarine to less than that of water so it would float. To contain these gasses (that I was going to be creating under water) I chose a 2 liter bottle to serve as the housing for my "submarine."

Electrolysis, as shown in the illustration, is the process of running an electrical current through a NaCl (salt) and water solution. What it accomplishes is breaking the bonds of the H_2O molecules into its constituent gasses of two parts H and one part O. What it looks like is just air forming in small bubbles on the metal cathodes.

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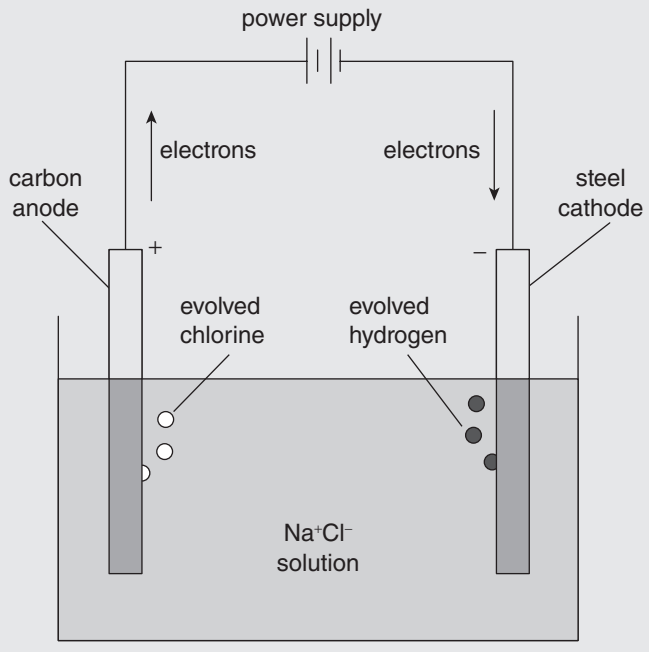

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I had solved the problem of getting my submarine up from the bottom of the tank but I still had to figure out how it would go back down to the bottom. What I ended up doing was devising a valve that would be sealed while under water, allowing the gasses to build up, and then open when it breached the surface of the water. I decided to use a cork and some rubber seals. The cork would float while under water, forcing the seals against each other but the cork would drop and break the seals from each other when the valve breached the surface.

I would leave the electrolysis process going constantly and as soon as that process created enough gasses inside the bottle to change the density to less than water the submarine would float up to the surface. Then the valve would release the gasses and the submarine would sink back down to the bottom.

Some things I learned with this project were the obvious problem solving and creativity skills, but I also learned about the concepts of buoyancy, density, and matter properties. By leaving this project open-ended the teacher allowed the students to be creative in the ways they approached the problem. That, in turn, led to a wide variety of submarines that the students created: from using Alka-Seltzer tablets to periodically dropping weights. On the concepts of buoyancy and density I learned how the density (mass per volume) of an object determines whether it will sink or float in liquid or gaseous solutions. If the density of an

object is less than that of the solution then it will be more buoyant than the solution; however, if the density is greater, then the object will be less buoyant and sink. For example, a balloon that is filled with air from a person's lungs will fall to the ground whereas one filled with helium will rise. The former sinks to the ground because the gas in the balloon has the same density as the air around it and the balloon has a small amount of weight. Those two factors together make the average density of the air filled balloon greater than the density of the air. The latter rises because the helium, being the second least dense element, changes the density of the balloon to less than that of the air around it. Lastly, I worked with the concept of matter properties when I used electrolysis to change water into gas in order to take advantage of the fact that gasses are far less dense than liquids.

Did you find these KUDs and evidence of transfer in Connor's recollection?

1. **K—**knowledge of terms: density, buoyancy, matter; knowledge of the electrolysis process; knowledge that gasses are less dense than liquids.
2. **U—**understanding that the density of an object determines its ability to sink or float in a liquid or gaseous solution.
3. **D—**able to change the average density of an object in a liquid solution to cause an object to raise and lower; able to solve a problem and reach a viable solution by drawing on prior knowledge and reasoning
4. **Transfer—**transferred the concept of density in comparing the ability to rise between air-filled and helium-filled balloons.

What makes this recollection even more special is that Connor is the grandson of coauthor Lynn Erickson. It is exciting to see concept-based teaching and learning taking place in one's own child's or grandchild's classroom. Thank you Mr. Presho!

Teachers have told us over the years how parents have called and written notes expressing their pleasure at the level of discussion and understanding of concepts coming from their children.

These authors are calling for the replacement of traditional objectives in curriculum frameworks with clearly written KUDs (Knowledge, Understanding, and Skills). This will provide teachers with the learning targets they need to achieve with students, while allowing them the latitude to draw on the science and art of teaching in designing for learning. Why do we feel the need to "tell" teachers the verbs they must

use with specific topics across all subject areas? Why not just provide the critical knowledge topics that need to be addressed in classrooms—without attaching a verb to these topics? Why not require that teachers internalize the "skill set" for their grade level and subject area(s) so *they* can design the learning experiences to develop the knowledge, understanding, and skills throughout the year. Certainly some skills must be taught before others in subjects like mathematics and language arts; but if teachers internalize the skills as written in the rich language of the discipline, they will incorporate them in more robust ways than simply tacking a single verb like *analyze* in front of a content topic.

PROBLEMS WITH TRADITIONAL CONTENT OBJECTIVES

Historically, curriculum has been framed by content and skill objectives relying on verbs such as *Identify, Explain, Analyze,* . . . , to suggest the level of mental processing. But we have too often *assumed* that "doing a verb with a topic" leads to deeper conceptual understanding. In fact, research shows that students, in science and mathematics especially, enter high school and college with many misconceptions of critical concepts. A particularly vivid example is the video, "A Private Universe," produced by the Harvard-Smithsonian Center for Astrophysics (1987). The demands of the 21st century call urgently for higher-order conceptual thinking abilities:

We have too often assumed that "doing a verb with a topic" leads to deeper conceptual understanding.

- The ability to see patterns and connections between new knowledge and prior knowledge through the transferable concepts and conceptual understandings
- The ability to categorize knowledge into conceptual schemata in the brain so that information can be processed efficiently
- The ability to transfer concepts and conceptual understandings through time, across cultures, and across situations

The traditional model of curriculum design fails to differentiate clearly between the factual and conceptual levels. This is a problem for educators who must learn to recognize the difference between the factual and conceptual levels in order to engage students in synergistic thinking. Certainly Anderson and Krathwohl's book addresses this problem with traditional curriculum designs, but the intentional inclusion and clear

differentiation between factual and conceptual objectives in curriculum documents remains spotty, at best.

In our workshops over the past two decades we have found that teachers have had minimal training on the differences and relationships between topics and concepts, and between facts and generalizations. This has become a critical component in all of our trainings for teachers and school administrators. We have seen some increase in teacher training institutions addressing concept-based curriculum and instruction in the past decade, but the practice is still not widespread.

Another major problem with the traditional model of curriculum design is that it is not idea-centered. Teachers can cite objectives (i.e., verbs linked to topics or skills) but when asked to state the conceptual understandings to be drawn from the topics and skills, they struggle to clearly articulate these ideas. It takes a different thinking process to articulate a conceptual understanding versus stating a content or skill objective. *To articulate a conceptual idea, one has to mentally think of the factual support as one crafts the idea*. This "wordsmithing" ability to craft a generalization can develop quickly with practice, but it is the kind of deep thinking seldom required or used in an objectives-driven model.

It takes a different thinking process to articulate a conceptual understanding versus stating a content or skill objective.

Concept-based curriculum designs require that teachers articulate what they want students to Know, Understand, and be able to Do. Some countries have national curricula and other countries require academic standards. These documents can be the starting point for unpacking Know, Understand, and able to Do expectations for a concept-based curricula. But all three components must be drawn out to build the local curricula. National curricula or academic standards are curriculum frameworks. They are not teachable curricula for the classroom. School districts or individual schools need to develop classroom curricula aligned to conceptual, factual, and skill expectations of academic standards or national curricula. Let's compare examples of traditional objectives for History with the more explicit concept-based model.

In Figure 1.1, the Traditional Curriculum Model, the focus is on what students are to Know. The skill is most often represented by a single verb that is used to drive the interaction with the topic. There may be some additional skill objectives drawn from state standards or national curricula that teachers can use to write learning experiences, but they feel responsible for meeting the verb/topic pairing in the required content objectives. The problem is that objectives formed by linking a specific topic to a particular verb do not ensure conceptual understanding. It is up to the teacher to go

Figure 1.1 Traditional Objectives Model

Unit Title: World War II

Students will:

1. **Identify** reasons for U.S. involvement in World War II, including the growth of dictatorships and the attack on Pearl Harbor.
2. **Analyze** major issues and events of World War II such as fighting the war on multiple fronts, the internment of Japanese Americans, the Holocaust, the Battle of Midway, the invasion of Normandy, and the development of and Harry Truman's decision to use the atomic bomb.
3. **Evaluate** the general costs and benefits of war to a nation and role-play the debate to enter a chosen international conflict from the perspective of one nation.
4. **Explain** the roles played by significant military leaders during World War II, including Omar Bradley, Dwight Eisenhower, Douglas MacArthur, George Marshall, and George Patton.

beyond the facts in this history example. This often fails to happen because of the objectives design. Even when conceptually stated objectives (see objective 3 in Figure 1.1) are provided, teachers without concept-based training will likely approach the objective as a verb-driven activity rather than as an idea to understand.

Figure 1.2 shows the concept-based model, which clearly calls for conceptual understanding as well as knowledge and skills. Notice that the choice of verbs is left up to teachers, though they are to draw from the rich repertoire of historical reasoning and thinking skills in a balanced manner throughout the year. This balance means that students will develop expertise and experience in the wide array of developmentally appropriate processes and skills across the year.

The concept-based model provides the teacher with significant conceptual understandings to be drawn from the students using an inductive teaching model that will be addressed in Chapter 4.

The traditional objectives focus on the content to cover, and the skills are usually no more than the skill verb that is attached to the content objective (Identify, Analyze, . . .) in content-driven subjects like history. The concept-based model lists the content for the unit but leaves the choice of verbs up to the history teacher in the design of learning experiences because the content is no longer the end point for instruction. The content is important for historical literacy, but it is also a tool to develop conceptual understandings that become frames for thinking about other similar

Figure 1.2 Concept-Based Model With KUDs

Students will KNOW . . .

- reasons for the United States' involvement in World War II.
- major issues and events of WWII, such as
  - Multiple fighting fronts
  - Internment of Japanese Americans
  - The Holocaust
  - The Battle of Midway
  - The invasion of Normandy
  - The decision to use the atom bomb and the aftereffects

Students will UNDERSTAND that . . .

- conflicts between nations can lead to shifts in the political, military, and economic balance of power with victorious nations gaining power and influence to drive their international agenda.
- "neutral" nations may be forced to intervene in international conflicts to protect their own political or economic interests.
- governments mobilize human, military, and economic resources in times of war.
- the call for military resources during times of war can create jobs and stimulate a weak economy.

Students will be able to (DO) . . .

- locate and use primary and secondary sources such as computer software, databases, media and news services, biographies, interviews, and artifacts to acquire information.
- analyze information by sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions.
- identify bias in written, oral, and visual material.

examples through time, across cultures, and across situations. This comparative ability to look for patterns, similarities, and differences deepens mental processing and conceptual understanding. The concept-based curriculum model provides a clearly delineated breakdown of the different levels and types of mental processing: Know factually, Understand conceptually, and be able to Do in skills and processes.

Historians would be quick to remind us that historical events and issues are set in time and context that make them unique. This is true—but it does not mean that generalizations cannot be drawn from historical events and issues through time. It does mean that we need to be careful when drawing these "lessons of history." The generalizations need to be factually supported by different examples throughout history. Another caution when writing conceptual understandings for history is to avoid

the common trap of "presentism" (Wineburg, 2001). Presentism means that a contemporary and culturally biased viewpoint is assigned incorrectly to the interpretation of past historical events. One example of this would be writings about the rapid industrial advances during the 19th century, in a time when unchecked change was widely celebrated—using present-day moral judgments condemning the environmental and labor practices without addressing the reasoning of the time period. The era, and the cultural and social context, is either not considered or is imprinted with a contemporary perspective. Writing conceptual understandings at the level of generality that can be supported by factual examples through time, and using the qualifiers such as "can" or "may" provides the flexibility to consider implications of time, place, and perspective. One must have a deep understanding of the facts, time, and context to avoid presentism.

We suggest that KUDs *replace* traditional objectives in curriculum frameworks because the KUDs *are* the objectives. But they are clearer than traditional objectives; provide greater specificity; differentiate between knowledge, understanding, and skills; and give teachers the information they need to thoughtfully design for learning. If state academic standards and national curricula would use the KUD framework, it would simplify the development of local curricula. Teachers would be given the critical conceptual understandings developed by subject specialists working together to identify the most essential conceptual understandings for each grade level and discipline at the state or national level. The Next Generations Science Standards in the United States are heading in the right direction with the inclusion of "Core Disciplinary Ideas"—which are essential conceptual understandings.

DISCUSSION QUESTIONS

1. Why have traditional objectives been the only model for curriculum guides since the mid-1950s?
2. Why are educators the world over realizing that concept-based curriculum and instruction provide a stronger model for guiding teaching and learning?
3. What do KUDs offer teachers that traditional objectives fail to address clearly?
4. How would you explain the difference between traditional objectives and the KUD model to parents? To a new teacher in your concept-based school?

SUMMARY

The long road to a concept-based curriculum and instruction model has been filled with switchbacks over the years. But the journey has moved progressively forward because of the many minds and efforts of teachers and educators worldwide who struggle with questions of what works and what does not work in schooling. Even during times when the field of curriculum design took wild swings this way or that, there were educators in classrooms and leadership positions who held to the notion that quality curriculum design must be more than covering lower level objectives in check-off fashion—that learning must be about applying, and transferring concepts and conceptual understandings, supported by facts and skills, across time, cultures, and situations. Conceptual transfer helps students see patterns and connections between similar situations; and provides a springboard for complex thinking and understanding—two critical areas of focus for workplace readiness as well as for lifelong learning. In Chapter 2 we will contrast the traditional two-dimensional curriculum design with the concept-based, three-dimensional designs for curriculum and instruction and will introduce the Structures of Content and Process.